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World's Largest Apple User Group Magazine

June 1986 • $3.00 U.S.

The Apple II — LaserWriter Connection

INSIDE:

- LaserWriter Graphics with an Apple II
- *pfs:file* to ProDOS Data Conversion
- Review of "COMPUTER-EYES" Video Digitizer

PLUS:

- History of Artificial Intelligence
- Spreadsheet Template Issues
- Helpful Hints, New Products, and more. . .

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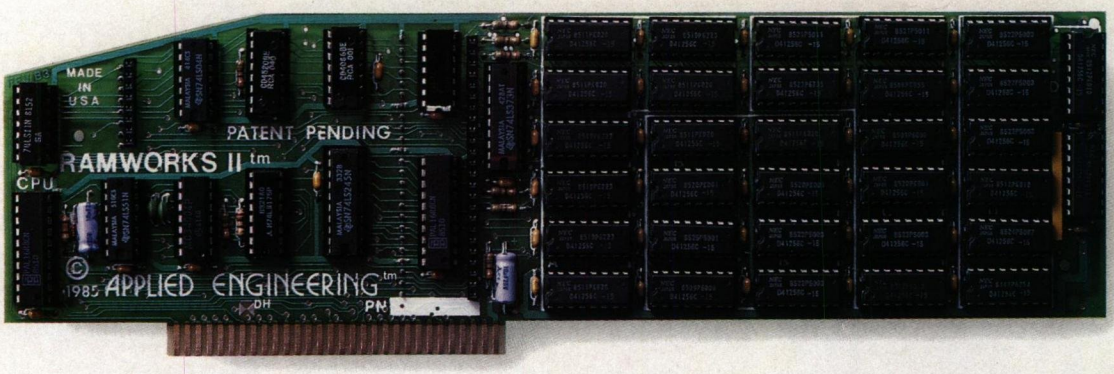
Apple PugetSound Program Library Exchange

RamWorks II®

The Best Selling, Most Compatible, Most Recommended, Most Expandable Card Available.



64K to 16 MEG! RamWorks II Is Number One.

It's simple, RamWorks II sells the most because it does the most.

The AppleWorks Amplifier.

While RamWorks II is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks II does. Naturally, you'd expect RamWorks II to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K in AppleWorks and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Just look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks II does. With a 256K or larger RamWorks II, all of AppleWorks will automatically load itself into RAM dramatically increasing speed by eliminating all the time required to access the program disk drive. Now switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks II eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 15,000. *Only* RamWorks II increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And *only* RamWorks II (256K or larger) offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. RamWorks II even expands the clipboard. And auto segments large files so they can be saved on two or more disks.

RamWorks II, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks II couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, The Spread Sheet, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks II is even compatible with software written for Apple cards. But unlike other cards, RamWorks II plugs into the IIe auxiliary slot providing our super sharp 80 column text in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

Highest Memory Expansion.

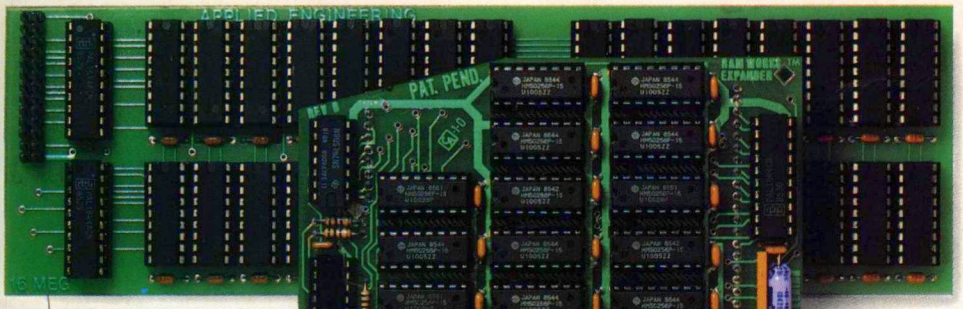
Applied Engineering has always offered the largest memory for the IIe and RamWorks II continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more, RamWorks II has the widest selection of expander cards available. Additional 512K, 2 MEG, or multiple 16 MEG cards just snap directly onto RamWorks II by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for over 20 years.

It Even Corrects Mistakes.

If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks II, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks II to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks II and with good reason. Some others combine RGB output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks II RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks II RGB option is more than just the ultimate in color output because unlike others, it's fully



16 MEG Expander

512K Expander

compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks II RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and remember you can order the RGB option with your RamWorks II or add it on at a later date.

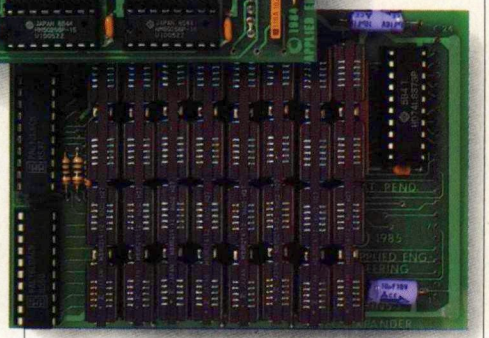
True 65C816 16 Bit Power.

RamWorks II has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

Steve Wozniak, creator of the Apple Computer said "I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks." A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks II is king of the hill."

Apple experts everywhere are impressed by RamWorks II's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks II in your Apple, you'll make IBM PC's and AT's look like slowpokes.



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It's Got It All

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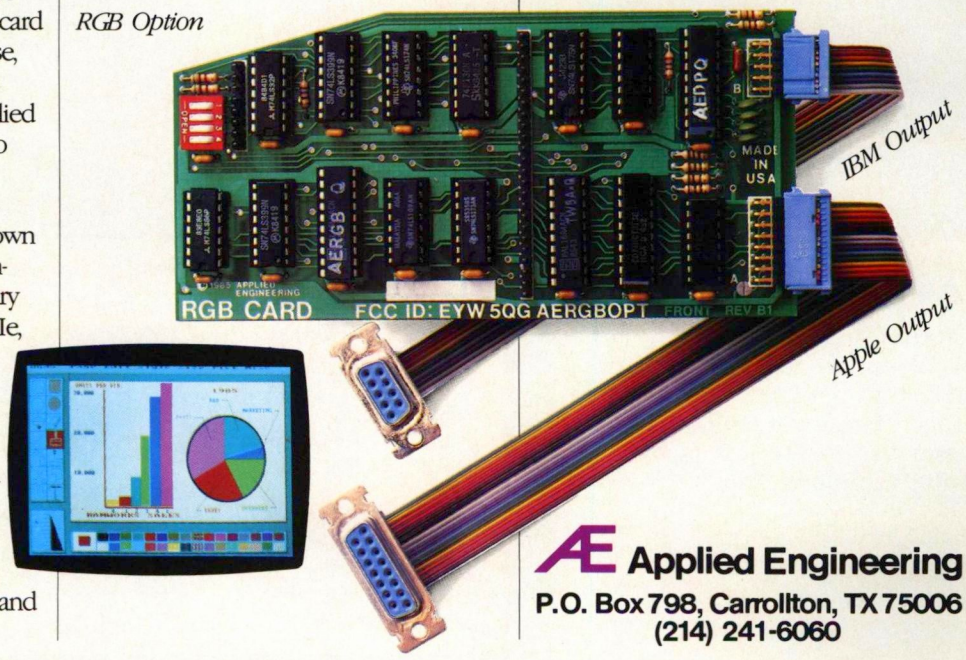
- Expandable to 16 meg with expander card, with NO slot 1 interference
- Can use 64K or 256K RAMs
- Powerful linear addressing 16 bit coprocessor port
- Automatic AppleWorks expansion up to 3017K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software

RGB Option



- RamDrive™ the ultimate disk emulation software included free
- Memory is easily partitioned allowing many programs to be in memory at once
- Compatible, RGB option featuring ultra high resolution color graphics and multiple text colors, with cables for both Apple and IBM type monitors
- Built-in self diagnostics software
- Lowest power consumption (patent pending)
- Takes only one slot (auxiliary) even when fully expanded
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- Much, much more!

RamWorks II with 64K	**$179**
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RamWorks II with 1.5 MEG	**$539**
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Volume 9, Number 6 June 1986

Official Publication of **A.P.P.L.E. Co-op** "People Helping People with Personal Technology".

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As the saying goes, difficult problems are tackled immediately; the impossible takes a little longer. Photos of computer and LaserWriter are courtesy of Apple Computer, Inc.

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NOTE: The Snapshot card uses DMA. It cannot be used when speedup cards are active.

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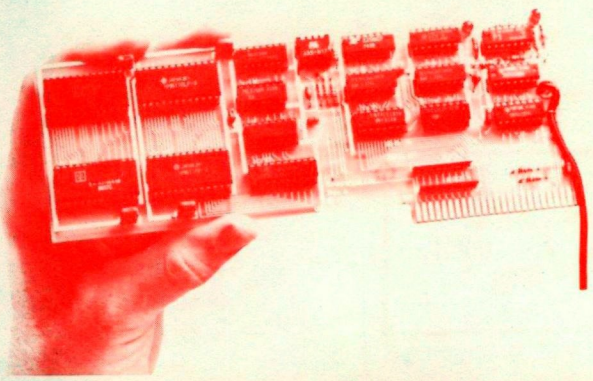

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BIGBOARD PCPI APPLICARD (STARCARD) driver now available. Great for speeding up Wordstar paging or handling that large dBase II database. Requires PCPI CP/M ver 2.0 (STARCP/M Ver 2.0) with INSTALL.COM Ver 2.7. (Other versions may be compatible but you are on your own! Upgrade currently available only through Personal Computer Products Customer Relations for $50 Arghh!. . . but with completely rewritten manual.)

Product: **BIG BOARD PCPI CP/M DRIVER**
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MacroWorks

Presenting the most asked-about program following a recent presentation to our local members on Appleworks enhancements: MacroWorks by Beagle Bros. This macro editor allows you to define a powerful set of commands, all available by pressing solid apple and one other key. Includes utilities to do multi-column printouts, an analyzer giving a sorted list of all words in a file (great for index or glossary generation), and a catalog sorter.

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6/86

6 Meg IIe/640k IIc

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Printed in U.S.A.

The INNER CIRCUIT

Don Elman

Getting Hooked on Computers

Are all addictions necessarily harmful? Some people say that "moderation" should apply to everything in life (with the possible exception of work or exercise). Others live by the principle, "If it feels good, do it." In a way, we can become addicted to certain things which undeniably enhance our lives, such as fresh air, good music, or love. Many of us would like to believe that our acquired need to rely on computers is, at worst, one of those benign habits.

Surely, excessive dependence on anything may eventually lead to detrimental effects. A primary danger of any true addiction is that an ever-increasing tolerance level develops, requiring greater and greater doses of the desired commodity in order to achieve a satisfactory kick. If you have reached the point where you can't decide whether to spend your last $500 on the newest super-accelerating-RAM-enhancing card or your past-due heating bill, or if your spouse has already given you an ultimatum such as "either IT goes or I do," then perhaps you're a candidate for Hackers Anonymous. Thinking about this potential problem, at least, might suggest new meanings for the term "computer user".

In This Issue

Our mainline feature this month, **The Apple II–LaserWriter Connection**, by Scott Anthony, should help to stave off your withdrawal symptoms for a while. Despite Apple's current lack of support for driving their laser printer with any computer other than the Macintosh or IBM, independent Apple II programmers have been making progress in this area, as this article graphically illustrates. Next, by popular demand, Wes Felty presents another tool for making wider use of *pfs* data in ***pfs:file* to ProDOS ASCII Converter**.

In the second part of **Issues in Using Spreadsheets**, Jeffrey Jacques focuses on some of the fundamental questions you should ask while developing a template, using a family budget as an example. Video digitizers can expand a computer's sensory input capacity, and Jim Hockenhull reviews one of the better ones, **COMPUTEREYES**. Our continuing series on **Silicon Intelligence**, by Michael and Lisa Storrie-Lombardi, this time takes an historical look at artificial intelligence.

If you take it all in under proper conditions, we trust that this mixture–along with our usual dose of columns, departments, and technical tips–will hold you over nicely until next month's fix.

MEMBER SERVICES

MAIN OFFICE: (206) 251-5222 • 8:30 a.m. -4:00 p.m. Pacific Time
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Accounting • Dealer Services • Marketing
Testing and Evaluation • Publications • Education

24 Hour Toll-Free Order Line: 1-800-426-3667 (U.S. except Washington state) Orders ONLY. Information not available.

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A.P.P.L.E. Crate Bulletin Board:

(206) 251-0543

Meetings: 7:30 p.m. third Tuesday of each month.
A.P.P.L.E. Headquarters • 290 S.W. 43rd St.
Renton, WA 98055 (except as noted)

Membership Information

available on postpaid tear-off card inside.

MEMBER BILLBOARD

June 1986

ANNUAL CO-OP MEETING REPORT

Following is a summary of the minutes from A.P.P.L.E. Co-op's annual business meeting, March 18, 1986.

APPLE PUGETSOUND PROGRAM
LIBRARY EXCHANGE CO-OP
RENTON, WASHINGTON 98055
MINUTES OF MARCH 18, 1986
GENERAL MEMBERSHIP ANNUAL MEETING

Call to Order:

The meeting was called to order at 7:35 pm by Dick Hubert, President. There were about 30 members in attendance.

Election Results:

After tabulating all valid ballots that had been received prior to the meeting, the Teller's Committee reported the names of officers and directors who were elected to serve in the coming year:

President:	**Dick Hubert**
Vice-president:	**Bob Huelsdonk**
Secretary:	**Dave DeGroot**
Treasurer:	**Bob Clardy**
Directors:	**Don Williams (2-yr)**
	Dave Lingwood (1-yr)
	Michael Storrie-Lombardi (1-yr)

Reading of the Minutes:

The minutes of the previous meeting were accepted as previously published in *Call -A.P.P.L.E.*.

Approval of Actions of the Board of Directors:

Approval of Board actions since the last annual meeting was moved, seconded, and passed. An annual report to the members was included in the March 1986 issue of *Call -A.P.P.L.E.* magazine.

Treasurer's Report:

For fiscal year 1985 (ending March 31, 1986), net income through February 28, 1986 was $23,566. Poor months in previous years have improved this year with the better market conditions and lower interest rates. Our net assets total $500,000.

February expenses include the costs of *Mac A.P.P.L.E.* magazine. Currently the editorial work for it is volunteered by Michael and Lisa Storrie-Lombardi and others. *Mac A.P.P.L.E.* is available either as a second magazine or as a substitute for *Call -A.P.P.L.E.*

Co-op Dividends:

Upon the closing of books for the year, the Board of Directors will be considering a patronage dividend, probably in the range of 2-5%.

One approach to redemption being explored will be to limit redemption credits toward future purchases. This restriction would save the organization substantial dollars.

Our Articles Of Incorporation/Constitution state that dividends are only redeemable by active members. Approximately 50% of the currently-active members have made purchases during the year, and will be eligible for dividends.

Membership Survey Results:

In 1985 the Co-op mailed out a survey to numerous members. Of those returned, the surveys indicated about 3,000 of these responding members are Apple II users and 500 are Macintosh users, suggesting that for the entire organization the ratio of Apple II owners to Macintosh owners is about 6:1. Many members responded that they also own and/or have access to IBM/Compatible computers.

After discussion of the survey, members of the audience were asked to make specific suggestions for improving the organization. The issues raised were:

1. Develop an education task force for Special Interest Group (SIG) development,
2. Print up a new member/potential new member information flyer,
3. Facilitate new member "hands-on" time just before the general meeting,
4. Encourage members to bring machines to the meetings for demonstrations and the like,
5. Offer a class to teach the programming language 'C',
6. Demonstrate expert systems,
7. Offer an informative computer in the front office,
8. Busy signals are very common on both the A.P.P.L.E Crate Computer BBS and the Hotline,
9. Offer programs for downloading from the BBS,
10. Consider charging for some services currently being offered for free as part of membership. Members should be encouraged to use Fastfind (an Apple II product) to obtain information from past issues of *Call -A.P.P.L.E.* magazine,
11. Print up a member interest directory,
12. Have the Co-op secretary publish the minutes of the meetings on the BBS
13. Publish a map to the Co-op offices,
14. Eliminate computer jargon in the member publications where practical so that new members will be able to better comprehend the various articles in them
15. Consider organizing the Co-op along product types,
16. Publish with the catalog a buying checklist,
17. Offer upgrade kits for earlier Apple IIs.

Adjournment:

The meeting was adjourned at 9:54 pm.

Respectfully submitted,
David E. DeGroot, Secretary

CHOSEN READER

Congratulations to J.J. Johnston of Pasadena, Texas, whose Reader's Choice card was drawn at a recent monthly meeting for a $100 credit toward the purchase of A.P.P.L.E. Co-op products. Note that members who subscribe to either *Call -A.P.P.L.E.* or *Mac A.P.P.L.E.* are eligible for this monthly drawing.

MODEM MGR™

MODEM MGR is a new modem communications program for the Apple][+, //e, enhanced //e, and //c. It supports most serial cards and internal or external "smart" or dumb modems at baud rates from 110 to 19200 baud.

MODEM MGR provides a large buffer to capture received text for reviewing, editing, saving to a disk file, or re-transmitting.

FEATURES: Modem control (dial, answer, hangup, where applicable), full-screen editor, programmed operation with macro script files, programmable function keys, XMODEM file transfers, error-free transfer of DOS 3.3 or ProDOS files, efficient transfer of sparse random-access files, unattended option with password protection, terminal emulation (DEC VT-52, DG D200, etc.), help screens, screen capture (snapshot), full- or split-screen display with block send (for CB, chat, or packet radio), continuous on-screen display of time-of-day or elapsed time (with some clock cards), auto XON/XOFF, auto disk save, carrier control or "smart" modem control, programmed dialing (from phone directory, function key, or macro script file), printing (from disk file, capture buffer, or online), and many other features.

MODEM MGR is fast. With a Videx 80-column card, it will receive and display ordinary text at baud rates up to 19200 baud continuously (non-stop) without losing any characters.

MODEM MGR supports Apple 40-column, Apple 80-column, Videx Videoterm or Ultraterm (all eight video modes), most printer, serial, multi-function, and modem cards, most external "smart", auto, or dumb modems, and some clock cards. The programs are supplied on both sides of three 5-1/4" disks (six sides) and are not copy protected. Instruction manual (284 pages) and both DOS 3.3 and ProDOS versions for only

$50

plus sales tax (Calif. residents) plus $3 shipping. Not available in any store. Send check to:

MGR Software
Suite 101
305 South State College Blvd.
Anaheim, CA 92806
(714) 993-0294

CIRCLE 25 READER SERVICE CARD

A.P.P.L.E. CONSULTANTS

Call-A.P.P.L.E. consultants are unpaid volunteers and perform a valuable service. Before placing a call, please make sure you know the time zone you are calling. No calls after 9pm please. Sometimes a consultant will have you leave your name and number and later return your calls. In all fairness, please expect the return call to be collect. We are always looking for more consultants. If you see an area that needs coverage, please drop us a note c/o *Charlie Stillman* with your qualifications and availability. The codes to the right of the phone numbers refer to time zones:

	P—Pacific	M—Mountain	C—Central	E—Eastern
Example:	1:00	2:00	3:00	4:00

'C'	Phil Pearson	(603) 362-4297	(E)
Accounting/B.P.I.	Mike Levinson	(713) 524-6747	(C)
Agriculture	Neil Clemmons	(314) 968-9618	(C)
Applesoft	Leon Raesly	(301) 460-0754	(E)
Applesoft (Australia)	Graeme Samways	048-851-541	
AppleWorks	Ina Levinson	(713) 524-6747	(C)
AppleWorks (India)	Arun Nath	660060 ext.609	
AppleWorks/Business (Israel)	Jeanni Spindel	972-052-83732	
Apple IIe (India)	Sanjay Kalra	660060 ext. 610	
Apple III (East)	Carmen Picardi	(603) 895-4447	(E)
Apple III (East)	Harry T. Hanson	(201) 467-0712	(E)
Apple III (East)	Stuart Yusem	(609) 822-9306	(E)
Apple III (West)	Bob Huelsdonk	(206) 542-7122	(P)
Apple III Pascal	Dennis R. Cohen	(818) 956-8559	(P)
Apple IIe (East)	John Hall	(617) 241-9050	(E)
AppleWriter	Don Lancaster	(602) 428-4073	(M)
AppleWriter II	Dennis Dahl	(Norway) 04-662-403	
Assembly Language	Don Lancaster	(602) 428-4073	(M)
Assembly Language	Scott Zimmerman	(801) 378-4100	(M)
Assembly/CP/M (East)	Dennis Baumgarte	(914) 856-2721	(E)
CP/M (Midwest)	Murray Arnow	(312) 878-0113	(C)
CP/M & Wordstar (Southern Africa)	Philip Christensen	(Maseru) 311056	
DBASE	Leon Raesly	(301) 460-0754	(E)
DBASE II (India)	Kalpana Dube	660060 ext.610	
DOS (East)	William P. Steinberg	(212) 921-0663	(E)
DOS (South)	Lee Meador	(817) 469-6019	(C)
DOS (West)	William Reynolds	(503) 472-4028	(P)
DOS/AppleSOFT Europe	Cornelis Bongers	31-010-525511 ext.3275	
Education	Ted Perry	(916) 485-1690	(P)
Fortran	Donald Geenen	(414) 984-3745	(C)
Franklin	Doug Trueman	(417) 679-4682	(C)
Geoscience	Tedd Sperling	(517) 393-1296	(E)
Handicapped Applications	Tom Deal M.D.	(206) 634-2847	(P)
Hardware/Am-Euro compatibility	Dennis Dahl	(Norway) 04-662-403	
Hardware Design, I/O Control	Stan Axelrod	(415) 563-1840	(P)
Hardware Interfacing	Randy Halvorson	(206) 783-9040	(P)
Hardware (Australia)	Graeme Samways	048-851-541	
Hi-Res	Ed So	(408) 267-3448	(P)
LaserWriter/Postscript	Don Lancaster	(602) 428-4073	(M)
Lisa	Fred Reitberger	(617) 587-9829	(E)
LISP	Frederick Naef	(703) 471-1479	(E)
Logo	Jeff Sandys	(206) 784-3317	(P)
Macintosh (Midwest)	Tim Smith	(309) 734-7451	(C)
Macintosh (West)	Dan Stinson	(206) 242-2590	(P)
Macintosh (East)	Dennis Baumgarte	(914) 856-2721	(E)
Macintosh (East)	Robert Forras	(516) 328-3433	(E)
Mathematics	Stowe Keller	(804) 971-6876	(E)
Multiplan	Richard Schubert	(716) 352-0837	(E)
Multiplan (India)	Pravin Bhambri	660060 ext.607	
Music	Stephen F. Lee	(704) 876-3444	(E)
Pascal (East)	Tom Woteki	(202) 547-0984	(E)
Pascal (Midwest)	Tim Smith	(309) 734-7451	(C)
Pascal (South)	Garry Flemings	(205) 279-7474	(C)
Pascal (West)	Paul E. Sleeper	(415) 494-1915	(P)
Pilot	Earl Keyser	(612) 429-5570	(C)
Pilot	Randy Warrens	(608) 837-9566	(C)
ProDOS/Apple IIe	Cecil Fretwell	(319) 236-0961	(C)
Spreadsheets	Jeffrey Jacques	(904) 385-7947	(E)
Statistics/Educ	Rich Hofman	(513) 529-4420	(E)
Stock Market	Robert Wood	(703) 893-9591	(E)
Visicalc (East)	George L. Hefter	(617) 256-3082	(E)
Visicalc (North)	Vince Aderante	(312) 289-9685	(C)
Visicalc (South Africa)	Brian Abrahams	(Durban) 315442	
Visicalc (South)	Dr. Bob Richard	(504) 466-0894	(C)
Word Processing	Leon Raesly	(301) 460-0754	(E)

Beagle Bros Apple® Software Report

Ad Number 252 — *"All the News That Fits"* — *Spring 1986*

TRIPLE-DUMP

Print any Apple image on your dot-matrix printer.

Use Triple-Dump with any Apple II and your dot matrix (graphics capable) printer to print:

- Hi-Res graphics
- Double Hi-Res graphics
- Lo-Res graphics
- Double Lo-Res graphics
- 40-Column text
- 80-Column text

Make "hard copies" of all kinds of images with absolutely no programming knowledge.

Or, if you're a programmer, use Triple-Dump's print routines in your own Applesoft programs.

Triple-Dump offers many special graphics effects options such as picture cropping, rotating and magnifying, plus the ability (on many printers) to adjust the print density.

BIG BANNERS TOO: Triple-Dump puts your printer to work making giant-letter 8½"-high signs for all occasions.

$39.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Written by Mark Simonsen and Rob Renstrom*

SHAPE MECHANIC

Hi-res shape animation and fancy hi-res typefaces

Shape Mechanic converts your hi-res drawings into "shape tables" so you can create title screens, charts and animation with Apple's built-in *Draw* and *Xdraw* commands. "List and Learn" demos on the Shape Mechanic disk teach you how to create your own hi-res programs.

HI-RES TYPE: 30 proportionally spaced hi-res screen display fonts (both large and small) are included on the Shape Mechanic disk. Each character may be redrawn as you choose.

SHADOW OUTLINE CHOMP
MOD S COMPUTE SKINNY
FATSO L.E.D. EMBOSSE
Penman BROADWAY BDW
SQUARE ZOOLOO

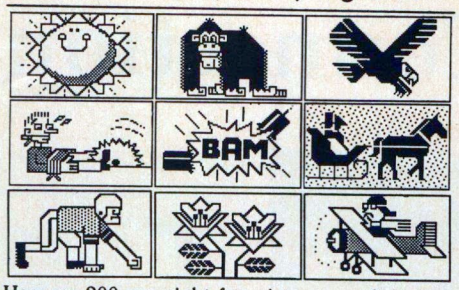
Shape Mechanic's new "SHAPE CAPTURE" feature lets you convert a section of any normal hi-res picture into a shape table.

No fee required to use Shape Mechanic's fonts & routines in programs that you sell. Just credit Beagle Bros in your program and manual.

$39.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Written by Bert Kersey and Mark Simonsen*

MINIPIX Disk#1

200 pictures for The Print Shop™ and other graphics programs



Here are 200 copyright-free pictures on disk, for you to use with the most popular Apple graphics programs, including...

- **The Print Shop**
- **MousePaint**
- **Shape Mechanic**
- **Alpha Plot**
- **Apple Mechanic**
- **Beagle Graphics**

...and almost any other Apple graphics program that deals with unprotected hi-res pictures.

Attention, PRINT SHOP owners!

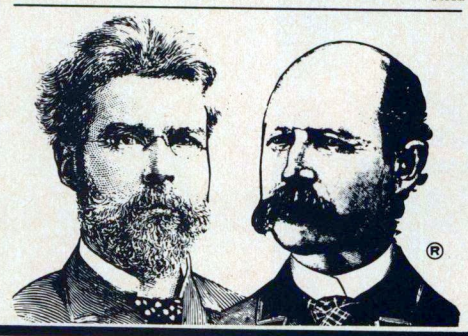
Use Minipix pictures straight from the Minipix disk on your greeting cards, banners and signs. And now you can convert part of *any* normal hi-res picture into Print Shop format! And use Minipix's picture editor to create special graphics effects like instant mirror images, negatives, distortions and blowups:

1. Normal
2. Mirror
3. Negative

MousePainters can load Minipix directly from the disk. *Alpha Plotters* can "clip" Minipix off the screen and "paste" them onto their own pictures. *Shape Mechanic* and *Apple Mechanic* fans can use Minipix in shape table format.

$29.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Minipix pictures by Fred and Sara Crone*

"The Print Shop" is a trade mark of Broderbund Software, Inc.



Beagle Bros MICRO SOFTWARE

3990 OLD TOWN AVENUE
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BUY BEAGLE BROS DISKS AT YOUR SOFTWARE STORE.
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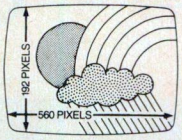
BEAGLE GRAPHICS

Double-high resolution plus 16 hi-res colors!

DOUBLE HI-RES FOR THE ARTIST...

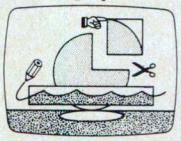


Beagle Graphics lets you use your 128K Apple to draw and label impressive double hi-res images (up to 560 pixels horizontally) using the Apple keyboard or, optionally, a joystick, AppleMouse, Koala Pad or Graphics Tablet.

And you can display *16 hi-res colors* with over 200 color-mixes and fast area "color fills".

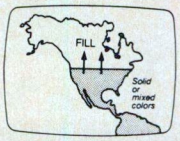
A **Variety of Typestyles** is included for labeling double hi-res pictures and charts.

Beagle Graphics' CUT AND PASTE feature makes graphic manipulations a snap—Any picture section may be individually altered or relocated to a new position on the screen. Or onto a completely different picture!



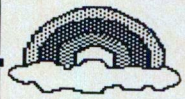
...OR FOR THE PROGRAMMER

You get 33 new commands for drawing, filling and manipulating double-res images. You can convert normal hi-res programs and pictures into double hi-res, save and load any image section, compress picture data to 1/3 disk space, produce double hi-res "slide shows" and more.



READ THE REVIEWS: *Family Computing,* Feb. 86, gives its highest rating (★★★★) to Beagle Graphics in $-Value, Graphics Quality, Documentation and Overall Performance.

$59.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple IIc or 128K IIe Written by Mark Simonsen*



```
]LIST
10 HGR2: CLEAR: ONERR GOTO 10
20 P=1+(P=1): POKE 49238-P,Z
30 POKE 230,32+P: POKE 28,C
40 CALL-3082: POKE 49235+P,Z
50 C=C+1: GOTO 20
```

FONT MECHANIC

30 new hi-res typefaces for Shape Mechanic (and Apple Mechanic)

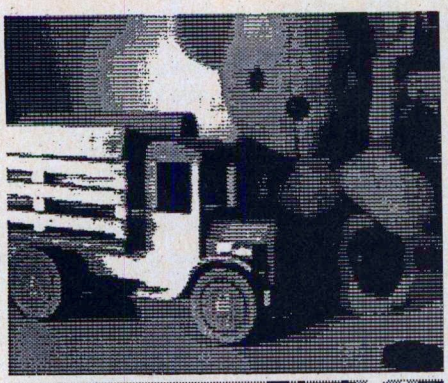
Font Mechanic's fonts work with all of the programs on Shape Mechanic and Apple Mechanic:

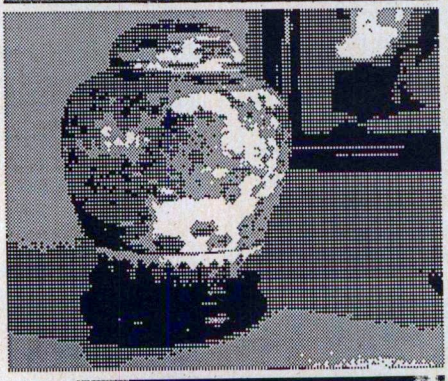
Old English CRATE FINE
ZEBRA UNCLE BRANDING
Caesar HOLLYWOOD
BELLS SANDWICH TIMES
U.S. OPEN EDISON
COUNTDOWN ROOSEVELT

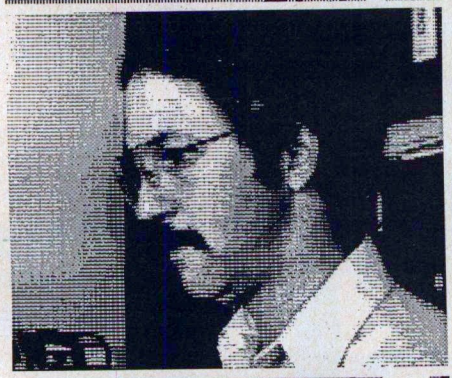
FONT UTILITIES: Font Mechanic lets you convert fonts from other disks (DOS Tool Kit, the Penguin disks, etc.) into fonts for Shape Mechanic and Apple Mechanic. Distort fonts too (s-t-r-e-t-c-h, COMPRESS, etc.) for hi-res copy-fitting and special effects.

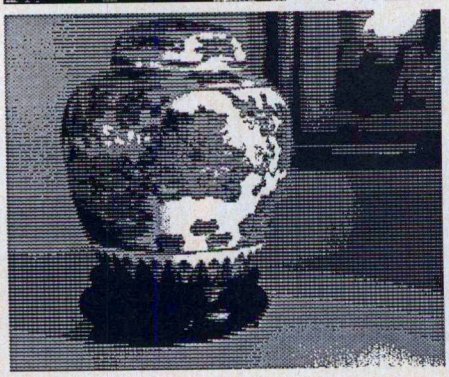
$29.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Written by Mark and Jon Simonsen*

The Apple II—LaserWriter Connection









Scott Anthony

THE strangest things have happened in the last couple of months since I took delivery of a LaserWriter. Virtually every Apple dealer I have talked to has told me that what I have been trying to do can't be done. They say the LaserWriter is supported only by the Macintosh (and in fine print, the IBM PC). One recent review of the LaserWriter as much as flatly stated that the LaserWriter could not be used with any other computer until Apple releases AppleTalk networking capabilities for the Apple II.

Well, contrary to all the above, my two year old *//e* is happily spewing out PostScript programs written with AppleWriter (thanks to the help of Don Lancaster of Synergistics), formatted text and graphics from FORTH screens, and single, double-hi-res, and quad-hi-res screen dumps (560 X 384!) from Applesoft and machine language (thanks to the help of Pat Caffrey of Computer Resource Consultants). Impossible indeed!

I would like to share some of the things I have learned in the form of a loose tutorial-history. While I know that the present cost of the LaserWriter severely limits the usefulness of much of what follows here to many readers of *Call -A.P.P.L.E.*, costs are coming down rapidly and may not be prohibitive for long, especially for groups of Apple users sharing a machine. It is not

unreasonable to imagine taking a //c into your local instant print shop and running your own programs on their LaserWriter. Also, the LaserWriter has two input ports. Since only one port is "listened to" at a time there is no reason to avoid plugging into both, one from a Mac and the other, generally unused, from a //e or //c. In fact, an Apple //c is almost automatically set up for connecting to the LaserWriter since it has what amounts to a built-in Super Serial Card.

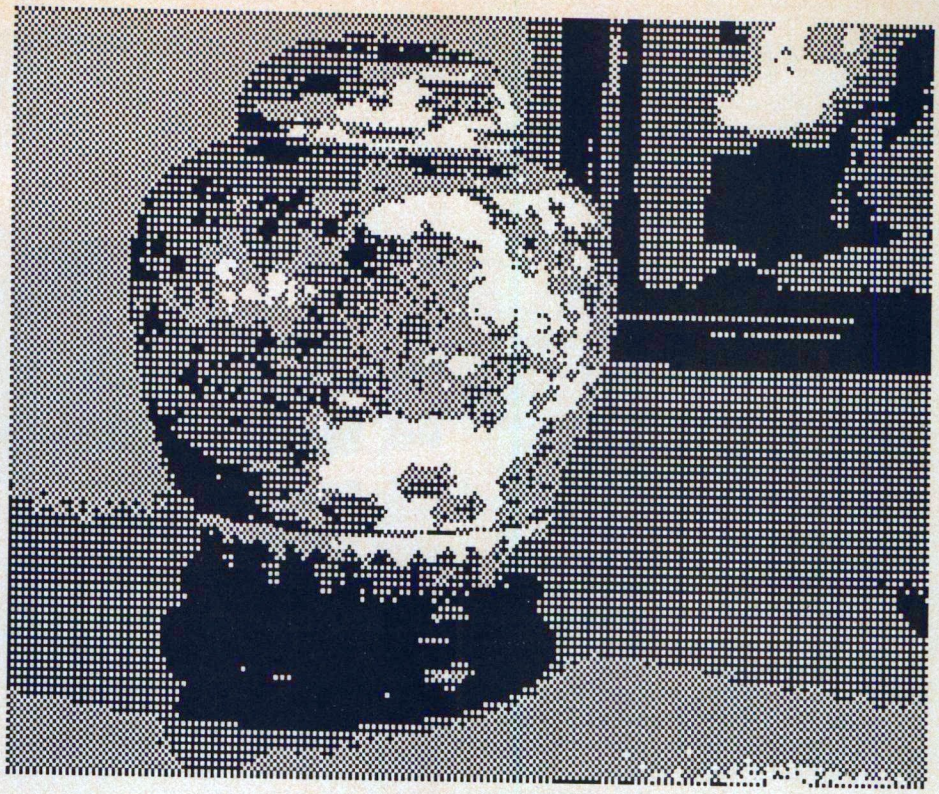
Setup and Initialization

Anyway, to get started (and to repeat), the LaserWriter has two serial ports. One is a standard RS-232 serial port with a DB-25 connector. The other is an RS-422 port with a DB-9 connector. I use the RS-232 from a SuperSerial card installed in slot 2 of my //e with the jumper block on the SSC pointing toward "modem." A bit of fiddling had to be done with the cable from the SSC to the LaserWriter for proper operation, but no more than any other "standard" serial connection requires. On the computer side, connect pins 4 and 5 of the DB-25. Pins 2 and 3 are set for "null modem," that is they are crossed (2 goes to 3, and 3 goes to 2). Also, pin 5 on the computer side goes to pin 20 on the LaserWriter side. Finally, be sure that the standard "signal ground," pin 7, is connected. See Figure 1 for a diagram of the minimum cable connection.

Bit-Mapped Graphics on the LaserWriter

Except in the "Diablo Emulation" mode, the LaserWriter understands only its built-in native language, PostScript, developed by Adobe Systems of Palo Alto, California as a page-description language with many powerful built-in graphics functions. PostScript is similar in some ways to FORTH, so that dyed-in-the-wool FORTH fanatics should have an easy time learning it. PostScript programs are straight ASCII text written with almost any word processing program and sent over the serial line to the LaserWriter. Entire program files or procedures can even be sent, as I discovered by experimenting, as individual lines of text in PRINT statements from Applesoft. In the case of the screen dump programs here, the text is from both Applesoft and 6502 machine code.

From the Apple II or //e there are three basic steps in the whole procedure of dumping the hi-res screen or controlling the LaserWriter with an Apple II in general. The first of these is critical and has almost nothing to do with the LaserWriter itself. It is to set up the Super Serial Card to send out text in the proper format without the LaserWriter knowing it. The LaserWriter needs to be able to see lower case letters, and objects strongly to any control characters, so the SSC must be set to transmit lower case unchanged and to block any control characters. This is most easily done from



Single Hi-Res Still Life

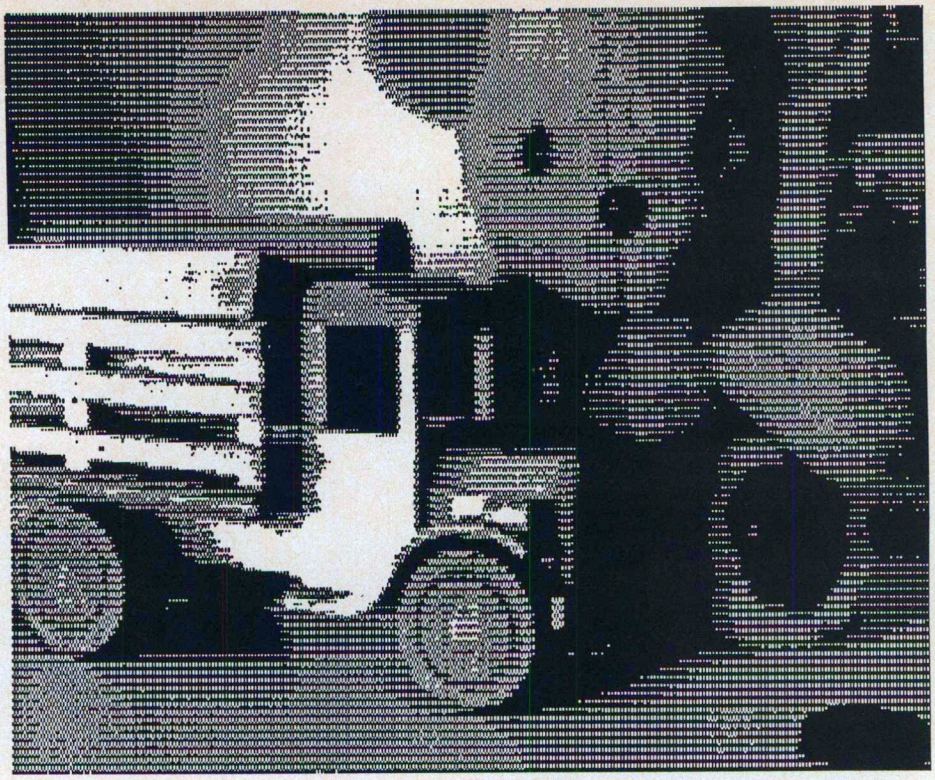
Quad Hi-Res Still Life

BASIC by poking the SSC's control register or by a STA instruction from machine language. This was the biggest hurdle to overcome while writing these programs, because the normal initialization of "PR#2" followed by (CTRL-A) "1T" (RETURN) (CTRL-A) "Z" (RETURN), which is supposed to allow lower case to pass unchanged and "zap" control characters, didn't work reliably. The (CTRL-A) apparently passed through and the LaserWriter would start blinking its amber colored light and abort the job before it even started. Actually, this is OK if nothing further is sent out to the LaserWriter until it has "timed out," about 30 seconds after it aborts a job.

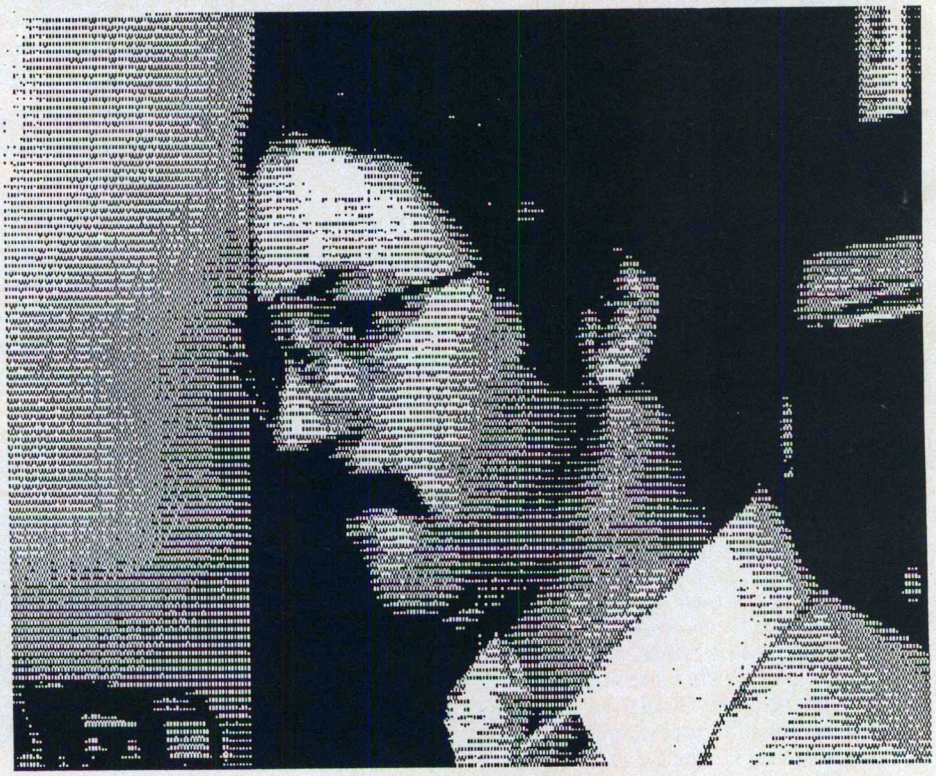
The second step, after the SSC is initialized (secretly), is to prepare the LaserWriter for receiving a graphic image. This preparation requires sending out some PostScript "operators" as follows:

1. Translate the image on the page in the form "xxx yyy translate" where xxx and yyy are the horizontal and vertical offsets from the *lower left corner* of an 8½" X 11" page. These numbers are in units of 1/72", the default user coordinate system units, so the center of the page is at 306 units over and 394 units up.
2. Scale the image in the form "hhh vvv scale" where hhh and vvv are the horizontal and vertical scale factors. One of many really great things about graphic images on the LaserWriter is the ability to independently vary the horizontal and vertical dimensions of any image over a ridiculously wide range. This is because PostScript takes an entire image at one time and sticks it in a square 1/72" on a side! Can you imagine all those dots in that small a space! Of course the LaserWriter can't print them all at that size since its resolution is only 300 dots per inch, so you need to scale the image to a reasonable minimum size. For a normal, single Apple hi-res page this is 280 dots/300 dots per inch by 192 lines/300 dots per inch, or about .93 inch by .64 inch. This works out in PostScript terms to be .93 * 72 by .64 * 72 or approximately "67 46 scale" for a minimum no-loss-of-resolution size.
3. Describe the transformation matrix in the form of "sss lll b [aaa 0 0 -lll 0 lll]." This one is a little hard to understand, and since I have never been trained in matrix algebra, my explanation may leave some math experts aghast, but I'll do my best.

The three numbers before the left bracket stand for the number of samples per line that PostScript expects to receive (sss), the number of lines expected (lll) and the number of image "bits" that each sample represents. In the simplest case, the Apple hi-res screen can be and usually is

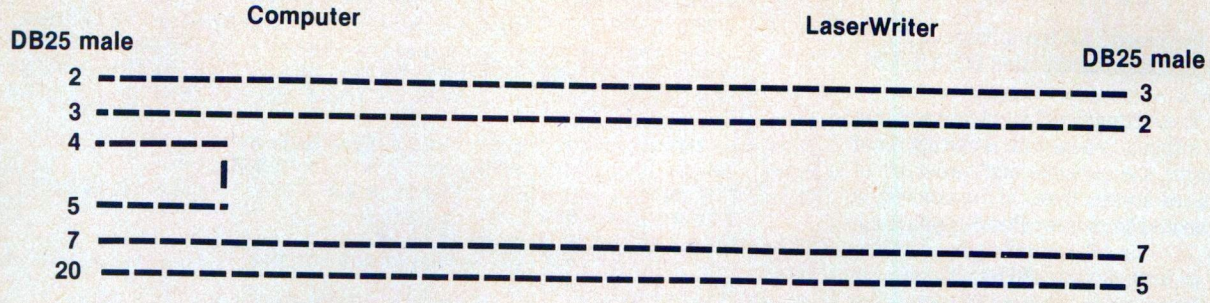


KID'S STUFF



SCOTT ANTHONY

Figure 1 Connector Diagram



LISTING 1

```
100 START = 32768
110  PRINT  CHR$ (4);"BLOAD LW.DP2"
120 T1$ = "LaserWriter Double Hi-Res Screen Dump":T2$ = "B
    y Scott Anthony":T3$ = "Copyright (c) 1985 by Scott A
    nthony"
130 TR$ = "[ 560 0 0 -192 0 192 ]{<"
140 S$ = "360 300 scale "
150 TL$ = "125 300 translate "
160  PRINT : PRINT  CHR$ (4);"PR#2"
170  PRINT  CHR$ (1);"1T"
175  PRINT  CHR$ (1);"14B"
180  PRINT  CHR$ (1);"X E"
185  PRINT  CHR$ (1);"Z"
187  PRINT  CHR$ (4);"PR#0"
190  GOTO 5000
1000  ONERR  GOTO 4000
1002  TEXT : HOME : INVERSE : PRINT " LOAD DOUBLE HIRES SC
    REENS ": NORMAL
1005  PRINT : PRINT : PRINT "CURRENT DRIVE IS "DR: PRINT "
    For Computech firmware card enter ": PRINT "'IN#(Slot
    )' (program now is configured  for slot 5)"
1010  PRINT : GOSUB 6500: GOSUB 3900
1040  PRINT  CHR$ (4);"BLOAD"TI$".1X,A$2000,D"DR
1042  POKE 33268,56
1043  CALL 33248
1044  PRINT  CHR$ (4);"BLOAD"TI$".1,A$2000,D"DR
1050  GOSUB 6600: GOSUB 6400
1060  GET A$
1070  IF A$ <  > "Y" THEN 1000
1080  GOTO 5000
1500  TEXT : HOME : PRINT : PRINT  CHR$ (4);"IN#5"
1510  PRINT "PRESS ANY KEY FOR MAIN MENU"
1515  PRINT : PRINT "To get Double-HiRes you must have a
      Computech Firmware card installed.      Press <CTR
    L>-A, <CTRL>-C for continuous frame grabbing.  Then p
    ress D for DoubleHiRes."
1520  PRINT : GET A$: PRINT
1530  PRINT : PRINT  CHR$ (4);"IN#0"
1540  POP : GOTO 5000
2000  TEXT : HOME : INVERSE : PRINT " SET LASERWRITER IMAG
    E PARAMETERS ": NORMAL
2010  VTAB 2: HTAB 1: PRINT : PRINT "Transformation matrix
     now is:": PRINT TR$
2020  PRINT "OK? (Y/N) ";: GET A$
2030  IF A$ = "Y" OR A$ = "y" THEN 2040
2035  PRINT "New Trans. matrix: ": INPUT TR$
2040  VTAB 7: HTAB 1: PRINT "Scale is: ";S$
2050  PRINT "OK? (Y/N) ";: GET A$
2060  IF A$ = "Y" OR A$ = "y" THEN 2070
2065  VTAB 8: HTAB 1: INPUT "New scale: ";S$
2070  VTAB 10: HTAB 1: PRINT "Position on page is ";TL$
2080  PRINT "OK? (Y/N) ";: GET A$
2090  IF A$ = "Y" OR A$ = "y" THEN 2100
2095  VTAB 11: HTAB 1: PRINT "New translation: ": INPUT TL
    $
2100  VTAB 18: HTAB 1: PRINT : INPUT "Length of scan line
    in samples: ";SL$: INPUT "Number of lines: ";LL$: INPUT
    "Bits per sample: ";BI$
2110  PRINT "OK? (Y/N) ";: GET A$
```

thought of as 280 samples per line, 192 lines, and 1 bit per sample. However, it could also be thought of, for example, as 140 samples per line, 192 lines, and 2 bits per sample. At any rate, the allowable "bits per sample" number is 1, 2, 4, or 8.

The numbers inside the brackets describe to PostScript where to place within the default 1/72″ image square all the thousands of samples which may follow. The negative number tells PostScript to begin placing the dots at the *upper left* corner of the image square rather than the normal PostScript default lower left. By making this number 0, you can get a flipped mirror image. Also, by manipulating these numbers, you can slant the image, flip it, or do a number of other interesting, weird things to it.

After preparing the LaserWriter with the image translation, scale, and transformation matrix information, the actual image is sent in the form of a string. Any string would be acceptable, but a hexadecimal string is the easiest to deal with. Without any bells and whistles, the hi-res screen is sampled byte by byte, each byte broken down into nibbles and sent out the serial port in the form of the ASCII text representation of the hex value of that nibble. In other words, if the value of the nibble were 15, it would be sent out as the letter "F," or ASCII 66.

Unfortunately, the layout of the Apple hi-res screen makes it impossible to directly sample and send. First of all, the bytes are all backwards on the screen! The normal representation of a byte of data is 8 zeros or ones with the lowest order bit on the right. The Apple screen shows the lowest order bit on the left. To complicate matters, this arrangement not only messes up the byte value of a screen byte, but doubly messes up the nibble value. So, before sending out any data, the sampled screen byte has to be broken into two nibbles, the lowest order nibble first since that is the left hand nibble on the screen, and then the hex value of that nibble sort of flipped over. For example, a nibble of data with the hex value of C would normally be represented as:

1100 = C hex

but on the Apple hi-res screen the value of

this nibble would be 3 hex like this:

0 0 1 1 = 3 hex

This is the reason for the strange order of the entries following the label **HEXTABL** in the source listings of these modules.

One final complication which was extremely difficult to deal with is getting rid of the colorbit, the invisible high order bit of every hi-res screen byte. If the colorbit is not eliminated somehow, PostScript actually sees 320 one bit samples per scan line coming its way, not the 280 bits that appear on the hi-res screen. This really messes up the printout if you set up the transformation matrix for 280 samples per scan line. What comes out looks like the image on a T.V. with no horizontal sync, which is essentially what has really happened. However, even with the proper adjustment to the numbers in the transformation matrix, the colorbit showed up as vertical lines which looked definitely bad.

I experimented and came up with two ways to deal with the colorbit, only one of which has been retained in the programs which follow. The first and crudest solution was to write a routine which cleared the colorbit if the next lowest order bit was set, and to set it otherwise. This worked fairly well, but still produced remnants of vertical lines, even though they were broken up and blended in reasonably well. The second and best solution was a routine to pack each hi-res scan line, eliminating the colorbit altogether. Since I didn't want to change the displayed screen image, each scan line is first moved to a buffer of either 40 or 80 bytes, depending on whether single or double hi-res is desired, and then packed before being converted and sent out.

Finally, following the long string of hex characters sent out to form the hi-res picture is an operator called the image operator. To summarize, for a normal, single resolution hi-res screen dump of about 5" wide by 3½" high and approximately centered on an 8½" X 11" page, the syntax of the series of expressions that PostScript needs is:

125 300 translate
360 300 scale
280 192 1 [280 0 0 -192 0 192]
{< long hex string of 15360 characters for a single resolution hi-res screen. . .
>}image

The curly brackets, or braces, tell PostScript that a procedure operated on by "image" is being performed, and the < and > brackets inform PostScript that the enclosed string is a hex string, not a normal character string. Be sure to experiment with the scale factors and the translation on the page. You could also add "-90 rotate" either before or after the "xxx yyy translate." I'm sure you can guess what that does.

```
2120  IF A$ <  > "Y" AND A$ <  > "y" THEN 2100
2130 SL$ = SL$ + " ":LL$ = LL$ + " ":BI$ = BI$ + " ":EN$ =
     ">}image "
2132  HOME : PRINT "This is how the LaserWriter will see
      the information you just entered: ": PRINT : PRINT
     : PRINT : PRINT TL$;S$: PRINT SL$;LL$;BI$;TR$: PRINT
     : PRINT "           SCREEN DATA HERE": PRINT : PRINT
     EN$;"showpage"
2134  PRINT : PRINT "OK? (Y/N) ";: GET A$
2136  IF A$ <  > "Y" AND A$ <  > "y" THEN 2000
2140  FOR N = 1 TO  LEN (TR$): POKE 33280 + N - 1, ASC ( MID$
     (TR$,N,1)): NEXT N
2150  POKE 33280 - 1 + N,255
2160  FOR N = 1 TO  LEN (S$): POKE 33344 + N - 1, ASC ( MID$
     (S$,N,1)): NEXT N
2170  POKE 33344 - 1 + N,255
2180  FOR N = 1 TO  LEN (TL$): POKE 33312 + N - 1, ASC ( MID$
     (TL$,N,1)): NEXT N
2190  POKE 33312 - 1 + N,255
2220  FOR N = 1 TO  LEN (SL$): POKE 33360 + N - 1, ASC ( MID$
     (SL$,N,1)): NEXT N
2230  POKE 33360 - 1 + N,255
2240  FOR N = 1 TO  LEN (LL$): POKE 33368 + N - 1, ASC ( MID$
     (LL$,N,1)): NEXT N
2250  POKE 33368 - 1 + N,255
2260  FOR N = 1 TO  LEN (BI$): POKE 33376 + N - 1, ASC ( MID$
     (BI$,N,1)): NEXT N
2270  POKE 33376 - 1 + N,255
2400  GOTO 5000
3000  HOME : VTAB 15: HTAB 1: PRINT "It takes almost 1 min
     ute to send the    Double HiRes screens, and after th
     e     flashing cursor reappears, another 45   seconds
      to process the image before the paper will be ejecte
     d. Be patient."
3001  PRINT : PRINT "How many copies? ";: INPUT CP$
3002  IF  VAL (CP$) < 2 THEN  GOTO 3005
3004  FOR N = 1 TO  LEN (CP$): POKE 33404 + N - 1, ASC ( MID$
     (CP$,N,1)): NEXT N
3005  POKE 33425,255: POKE 32775, VAL (CP$) - 1
3007  PRINT : INPUT "Title of picture: ";TI$
3008  IF TI$ =  CHR$ (13) THEN 3060
3010  PRINT : PRINT "Wait for the flashing cursor to reapp
     earbefore proceeding."
3015  PRINT : PRINT "This is PostScript telling the printe
     r  what the title of your picture is and   where to p
     ut it..."
3020  PRINT : PRINT  CHR$ (4);"PR#2"
3040  POKE 49322,11: POKE 49323,30
3045  PRINT "/xpos {612 ("TI$") stringwidth pop sub 2 div}
     def "
3050  PRINT "/Times-Roman findfont 14 scalefont setfont xp
     os 240 moveto ("TI$")show "
3060  CALL START
3070  PRINT  CHR$ (4);"PR#0"
3080  GOTO 5000
3500 M$ = " SAVE DOUBLE HIRES SCREENS ": TEXT : HOME : INVERSE
     : PRINT M$: NORMAL : PRINT : PRINT "CURRENT DRIVE IS
     ";DR
3510  PRINT : PRINT "    This operation takes a total of
        about 30 seconds and uses up almost     1/8 of a d
     isk.  Be sure you really      want to save the pictur
     e."
3520  GOSUB 6500: GOSUB 3900
3530  PRINT  CHR$ (4);"MONICO"
3540  PRINT  CHR$ (4);"BSAVE"TI$".1,A$2000,L$1FFF,D2"
3550  POKE 33268,24
3560  CALL 33248: REM      MOVE AUX TO MAIN
3570  PRINT  CHR$ (4);"BSAVE"TI$".1X,A$2000,L$1FFF,D2"
3580  PRINT  CHR$ (4);"NOMON"
3590  PRINT "DONE. . .Hit a key. ";: GET A$: PRINT : GOTO
     5000
3700 M$ = " SAVE LASERWRITER PARAMETERS ": TEXT : HOME : INVERSE
     : PRINT M$: NORMAL : PRINT : PRINT "CURRENT DRIVE IS
     ";DR: GOSUB 6500
3720  GOSUB 3900
3730  PRINT  CHR$ (4);"BSAVE "TI$".DP/PARAMS,A$8200,L$80,D
     "DR
3740  GOTO 5000
```

```
3800 M$ = " LOAD LASERWRITER PARAMETERS ": TEXT : HOME : INVERSE
     : PRINT M$: NORMAL : PRINT : PRINT "CURRENT DRIVE IS
     ";DR: GOSUB 6500
3810  GOSUB 3900
3820  PRINT  CHR$ (4);"BLOAD"TI$".DP/PARAMS,A$8200,L$80,D"
     DR
3830 TR$ = "":TL$ = "":SC$ = "":SL$ = "":LL$ = "":BI$ = ""

3840  FOR N = 1 TO 32:P$ =  CHR$ ( PEEK (33280 + N - 1)):T
     R$ = TR$ + P$: IF  PEEK (33280 + N - 1) = 255 THEN N =
     32: GOTO 3845
3842  NEXT N
3845  FOR N = 1 TO 32:P$ =  CHR$ ( PEEK (33312 + N - 1)):T
     L$ = TL$ + P$: IF  PEEK (33312 + N - 1) = 255 THEN N =
     32: GOTO 3850
3847  NEXT N
3850  FOR N = 1 TO 16:P$ =  CHR$ ( PEEK (33344 + N - 1)):S
     C$ = SC$ + P$: IF  PEEK (33344 + N - 1) = 255 THEN N =
     16: GOTO 3855
3852  NEXT N
3855  FOR N = 1 TO 8:P$ =  CHR$ ( PEEK (33360 + N - 1)):SL
     $ = SL$ + P$: IF  PEEK (33360 + N - 1) = 255 THEN N =
     8: GOTO 3860
3857  NEXT N
3860  FOR N = 1 TO 8:P$ =  CHR$ ( PEEK (33368 + N - 1)):LL
     $ = LL$ + P$: IF  PEEK (33368 + N - 1) = 255 THEN N =
     8: GOTO 3865
3862  NEXT N
3865  FOR N = 1 TO 8:P$ =  CHR$ ( PEEK (33376 + N - 1)):BI
     $ = BI$ + P$: IF  PEEK (33376 + N - 1) = 255 THEN N =
     8: GOTO 3870
3867  NEXT N
3870  GOTO 5000
3900  GOSUB 6200 VTAB 10: HTAB 1: PRINT "Put data disk in
     drive ";DR
3910  VTAB 12: HTAB 1: INPUT "File name: ";TI$
3920  IF TI$ = "D" OR TI$ = "d" THEN  GOSUB 6300: GOTO 390
     0
3930  IF TI$ = "IN#5" THEN  GOTO 1500
3940  IF TI$ = "R" OR TI$ = "r" THEN  POP : GOTO 5000
3950  PRINT : PRINT TI$;: PRINT " OK? ";: GET A$: PRINT
3960  IF A$ <  > "Y" AND A$ <  > "y" THEN 3900
3970  RETURN
4000  IF  PEEK (222) = 6 THEN  PRINT : PRINT "FILE NOT ON
     THE CURRENT DISK - HIT A KEY"
4010  GET A$: POKE 216,0
5000 A =  FRE (0): TEXT : HOME : GOSUB 6000: GOSUB 6100:DR
      = 1
5010  VTAB 10: HTAB 8: PRINT "1 - Load an Image"
5020  VTAB 11: HTAB 8: PRINT "2 - Set Up LaserWriter"
5030  VTAB 12: HTAB 8: PRINT "3 - Print Image"
5040  VTAB 13: HTAB 8: PRINT "4 - Save images"
5050  VTAB 14: HTAB 8: PRINT "5 - Save Parameters"
5060  VTAB 15: HTAB 8: PRINT "6 - Load Parameters"
5070  VTAB 16: HTAB 8: PRINT "7 - Program selector menu"
5080  GET A$
5090 A =  VAL (A$): ON A GOTO 1000,2000,3000,3500,3700,380
     0,5500
5100  GOTO 5000
5500  PRINT : PRINT  CHR$ (4);"RUN LW.MENU,D1"
6000  FOR N = 1 TO 40: PRINT ";: NEXT N: FOR L = 1 TO 6:
     PRINT ";: FOR M = 2 TO 39: PRINT " ";: NEXT M: PRINT
     ";: NEXT L: FOR N = 1 TO 40: PRINT ";: NEXT N: RETURN

6100  VTAB 3: HTAB 22 -  LEN (T1$) / 2: PRINT T1$: VTAB 5:
     HTAB 22 -  LEN (T2$) / 2: PRINT T2$: VTAB 6: HTAB 22
     -  LEN (T3$) / 2: PRINT T3$: RETURN
6200  HOME : PRINT : PRINT  CHR$ (4);"CATALOG,D"DR: PRINT
     : PRINT "HIT A KEY . . .": GET A$: HOME : PRINT M$: RETURN

6300 DR = 2 * (DR = 1) + 1 * (DR = 2): RETURN
6400  VTAB 21: HTAB 1: CALL  - 958: PRINT "CURRENT IMAGE:
     ";TI$: PRINT "IS THIS O.K.? (Y/N) ": RETURN
6500  VTAB 21: HTAB 1: PRINT "<C>-<RETURN> CATALOG": PRINT
     "<D>-<RETURN> CHANGE DRIVE": PRINT "<R>-<RETURN> MAIN
     MENU": RETURN
6600  POKE  - 16304,0: POKE  - 16301,0: POKE  - 16300,0: POKE
     - 16297,0: RETURN
```

In order to actually print the image on paper a final command must be issued. This command is either "showpage" to print and eject one copy and reset the LaserWriter or "n {copypage} repeat" where n can be almost any number of copies. The repeat operator is one form of PostScript loop, where copypage is an executable array or procedure (because it is enclosed in curly brackets) repeated n number of times. The "copypage" procedure does not reset or clear the image after ejecting a sheet of paper like "showpage" does.

Once the image is generated internally (taking about 1 minute to send all the characters, and another 30 seconds of image generation for a single hi-res screen), the picture will be reproduced at 8 pages per minute if desired. Double hi-res pictures take about twice as long. Also, the overall size and scaling of the image influences the time needed for image generation.

The LaserWriter Graphics Programs

The two programs included here form a complete double hi-res screen dump utility. The Applesoft program LW.DP.BAS (Listing 1) is menu driven and allows you to load double hi-res images, change LaserWriter parameters, translation, and scale, and insert a centered title in the Times-Roman font under the printed picture. It also loads the machine language routines, including the table of hi-res base addresses, for a double hi-res screen dump. Type it in and save it.

Next, enter the machine language code, Listing 2. This is best done with an assembler, but with some care, the entire module could be entered directly into memory from the Apple monitor. Refer to any good Apple machine language instruction book for specific directions on doing this. All the assembly source routines have liberal remarks which should allow you to follow their logic. With these remarks and the previous explanations you should have no trouble understanding how the programs work. The machine code should be entered beginning at address $8000 and saved by typing "BSAVE LW.DP2, A$8000,L$49E".

One subroutine in the machine language code deserves a bit of further explanation. The LaserWriter's input buffer fills up after receiving about 5000 bytes. When this happens, the input stream must be stopped temporarily to allow the 68000 in the LaserWriter to process the data and then resume taking in more. The LaserWriter uses the "X-ON / X-OFF" serial protocol to do this. So, after sending out each hex character, the programs check the Apple Super Serial Card *input* register to see if anything is there. If so, there is a OJSR& to a subroutine called CHECK which checks for the character CTRL-S, the X-OFF character,

which is the LaserWriter's signal to stop sending for a while. If that character is present, the check routine loops until the input register contains the character CTRL-Q, the X-ON signal to resume.

The programs are written with the assumption that the Super Serial Card is in slot 2, the recommended communications slot. If the card is in any other slot, the SSC register addresses will need to be changed:

ACIA Command Register	**$C0nA (n = slot# + 8)**
ACIA Control Register	**$C0nB**
Data Transmit/Receive	**$C0n8**
ACIA Status	**$C0n9**

Entering the programs should be fairly straightforward. As mentioned before, the use of an assembler is recommended for the machine language code.

The section of the Applesoft module which refers to the Computech Video Digitizer firmware card (accessed by "IN#5" for my setup) are obviously not necessary if you don't have one of these cards. However, this card and the Computech Video Digitizer itself allow you to capture up to quad-hi-res images (560 X 384 pixels) with a black and white video camera and display them in real time (see accompanying figures). The resulting LaserWriter screen dump is outstanding, and is superior to anything I have ever seen from the Macintosh. In addition, the firmware card has many fast, useful screen manipulating routines. I highly recommend these two products for their quality, ease of use and utility.

Summary

The graphics possibilities of the LaserWriter - Apple II combination are really fascinating and just beginning to be realized. Despite Apple's official downplaying of it, the potential of the two machines at least equals the performance of the Macintosh-LaserWriter marriage.

I hope that these programs are just a start in the direction of making the LaserWriter a standard printer option for many of the commercial graphics programs on the market, as well as stimulating the production of new graphics and text formatting utilities which utilize the LaserWriter and Apple II exclusively.

Many thanks are due to a couple of people who helped me hurdle some of the numerous obstacles I encountered doing this work. Pat Caffrey of Computer Resource Consultants here in San Francisco, a silent master of the 6502, cleared up a number of bugs in the SSC initialization routines and, in literally 5 minutes, typed in the code to convert screen bytes to hex nibbles. Bill MaGinnis has been trying to convert me to Forth for a number of years, and made my first pages of LaserWriter output possible by sending out Forth screens with procedures written on them. Thanks to both of you.

LISTING 2
LASERWRITER SCREEN DUMP UTILITY

```
                        13  * ***************************** *
                        14  *                               *
                        15  *       COPYRIGHT 1985          *
                        16  *            BY                 *
                        17  *       SCOTT ANTHONY           *
                        18  *                               *
                        19  *                               *
                        20  *                               *
                        21  *                               *
                        22  *********************************
                        23  *
                        24  * PROGRAM ASSEMBLED WITH MERLIN ASSEMBLER
                        25  * THIS IS A FINAL VERSION, FULLY DEBUGGED
                        26  *
                        27  *
                        28          ORG   $8000
                        29  *
8000: 4C 1A 80          30  PRINT    JMP   SETUP1
8003: 00                31  SPARE1   DS    1
8004: 00                32  SPARE2   DS    1
8005: 00                33  SPARE3   DS    1
8006: 00                34  BYTE     DS    1          ;# OF BYTE ALONG LINE
8007: 00                35  NUM      DS    1          ;MULTIPLE COPIES FLAG (32775)
8008: 00                36  DBYTE    DS    1          ;# OF BYTE ALONG DHGR LINE
8009: 00                37  LNNUM    DS    1          ;GRAPHICS PAGE LINE #
800A: 00                38  TMP1     DS    1
800B: 00                39  LCTR     DS    1          ;GEN PURPOSE COUNTER
800C: 00                40  BCTR     DS    1
                        41  HPOSN    EQU   $F411
                        42  TEMP1    EQU   $05
                        43  TEMP2    EQU   $06
                        44  HBASL    EQU   $26
                        45  HBASH    EQU   $27
                        46  DATA     EQU   $C0A8      ;ACIA RECEIVE/TRANSMIT REGISTER
                        47  STATUS   EQU   $C0A9      ;ACIA STATUS REGISTER
                        48  HGR      EQU   $C057
                        49  *
                        50  STOR80OFF EQU  $C000
                        51  RAMRDOFF EQU   $C002      ;READ MAIN MEM
                        52  RAMRDON  EQU   $C003      ;READ AUX
                        53  RAMWRTOFF EQU  $C004      ;WRITE MAIN
                        54  RAMWRT   EQU   $C005      ;WRITE AUX
                        55  STOR80ON EQU   $C001
                        56  ALTZP    EQU   $C008
                        57  AN3      EQU   $C05E
                        58  COL80    EQU   $C00D
                        59  PAGE2ON  EQU   $C055
                        60  PAGE2OFF EQU   $C054
                        61  TEXT     EQU   $C050
                        62  MIXSET   EQU   $C053
                        63  HIRESOFF EQU   $C056
                        64  HIRES    EQU   $C057
                        65  *
                        66  AUXMOVE  EQU   $C311
                        67  A1L      EQU   $3C        ;A1 HOLDS SOURCE START ADDRESS
                        68  A1H      EQU   $3D
                        69  A2L      EQU   $3E        ;A2 HOLDS SOURCE END ADDRESS
                        70  A2H      EQU   $3F
                        71  A4L      EQU   $42        ;A4 HOLDS TARGET START ADDRESS
                        72  A4H      EQU   $43
                        73  * SEC - MAIN TO AUX MOVE
                        74  * CLC - AUX TO MAIN MOVE
                        75  *
                        76  GETAUX   EQU   $100       ;SPECIAL SUBROUTINE
                        77  *
                        78  *
                        79  *********************************
                        80  *
                        81  * SETUP AND MOVE SUBROUTINE
                        82  * "GET AUX" TO BOTTOM OF
                        83  * STACK.  USUALLY WILL NOT GET IN
                        84  * THE WAY OF ANYTHING.
                        85  *
                        86  *********************************
                        87  *
800D: 4C 1A 80          88          JMP   SETUP1
                        89  *
                        90  SETUP    EQU   *
8010: 8D 03 C0          91          STA   RAMRDON
8013: B1 26             92          LDA   (HBASL),Y
8015: 8D 02 C0          93          STA   RAMRDOFF
8018: 60                94          RTS
8019: FF                95          DFB   $FF
801A: A0 00             96  SETUP1   LDY   #$00
801C: B9 10 80          97          LDA   SETUP,Y
801F: 99 00 01          98  S2       STA   GETAUX,Y
8022: C8                99          INY
8023: B9 10 80          100         LDA   SETUP,Y
8026: C9 FF             101         CMP   #$FF
8028: D0 F5             102         BNE   S2
                        103 *
```

```
                        104 **********************************
                        105 *
                        106 * INITIALIZATION - SEND LASERWRITER STRINGS
                        107 *
                        108 **********************************
                        109 *
802A: A9 00             110 DINIT     LDA   #$00        ;INITIALIZE ALL TEMP LOCATIONS
802C: 8D 09 80          111           STA   LNNUM
802F: 8D 0A 80          112           STA   TMP1
8032: A9 01             113           LDA   #$01        ;SET SOME FLAGS
8034: A9 0B             114           LDA   #$0B        ;INIT ACIA COMMAND REGISTER
8036: 8D AA C0          115           STA   $C0AA       ;
8039: A9 1E             116           LDA   #$1E        ;INIT ACIA CONTROL REGISTER

803B: 8D AB C0          117           STA   $C0AB       ;  0 00 1 1110  9600,8,N,1
803E: A9 20             118           LDA   #TRANSLATE-STRING
8040: 20 13 81          119           JSR   OUTSTR
8043: A9 40             120           LDA   #SCALE-STRING
8045: 20 13 81          121           JSR   OUTSTR
8048: A9 50             122           LDA   #SLENGTH-STRING
804A: 20 13 81          123           JSR   OUTSTR
804D: A9 58             124           LDA   #LINES-STRING
804F: 20 13 81          125           JSR   OUTSTR
8052: A9 60             126           LDA   #BITSPER-STRING
8054: 20 13 81          127           JSR   OUTSTR
8057: A9 00             128           LDA   #TRANSMAT-STRING
8059: 20 13 81          129           JSR   OUTSTR
                        130 *
                        131 **********************************
                        132 *
                        133 * READ SCREENS ROUTINE
                        134 *
                        135 **********************************
                        136 *
805C: A9 00             137 ROWSTART LDA    #0           ;INIT TO FIRST BYTE
805E: 8D 06 80          138          STA    BYTE         ;SET BYTE COUNT
8061: 8D 09 80          139          STA    LNNUM        ;FIRST LINE OF SCREEN
                        140
8064: A9 C0             141 ROWLOOP  LDA    #192         ;SET COUNTERS
8066: 8D 0B 80          142          STA    LCTR
8069: A9 28             143          LDA    #40
806B: 8D 0C 80          144          STA    BCTR
                        145
806E: AE 09 80          146 RL0      LDX    LNNUM        ;GET LINE NUMBER
8071: BD 11 83          147          LDA    YTABLL,X     ;GET BASE ADDRESS FROM TABLE
8074: 85 26             148          STA    HBASL
8076: BD D1 83          149          LDA    YTABLH,X
8079: 85 27             150          STA    HBASH
807B: A2 00             151          LDX    #0           ;SET DOUBLE BYTE INDEX
                        152
807D: AC 06 80          153 RL1      LDY    BYTE         ;GET BYTE #
8080: 20 00 01          154          JSR    GETAUX       ;GET BYTE FROM AUX MEM
8083: 9D 91 82          155          STA    BUFF,X
8086: E8                156          INX                 ;MASK COLORBIT
                        157
8087: AC 06 80          158          LDY    BYTE         ;GET OFFSET AGAIN
808A: B1 26             159          LDA    (HBASL),Y    ;GET SCREEN BYTE FROM THE SAME SP
OT
808C: 9D 91 82          160          STA    BUFF,X       ;     MAIN MEMORY
808F: E8                161          INX
                        162
8090: EE 06 80          163 RL2      INC    BYTE         ;POINT TO NEXT BYTE OFFSET
8093: CE 0C 80          164          DEC    BCTR         ;DONE WITH ROW?
8096: D0 E5             165          BNE    RL1          ;     NO, CONTINUE
8098: 20 C5 80          166          JSR    ROTBITS
                        167
809B: A9 00             168          LDA    #$00         ;     YES, RESET FOR NEXT ROW
809D: 8D 06 80          169          STA    BYTE         ;RESET OFFSET
80A0: A9 28             170          LDA    #40
80A2: 8D 0C 80          171          STA    BCTR
80A5: EE 09 80          172          INC    LNNUM        ;INCREMENT LINE NUMBER
80A8: CE 0B 80          173          DEC    LCTR         ;DONE WITH SCREEN?
80AB: F0 03             174          BEQ    DEND         ;     YES, ALL DONE
80AD: 4C 6E 80          175          JMP    RL0          ;     NO, LOOP SOME MORE
                        176
80B0: A9 68             177 DEND     LDA    #ENDARRAY-STRING
80B2: 20 13 81          178          JSR    OUTSTR
80B5: AD 07 80          179          LDA    NUM          ;MORE THAN 1 COPY?
80B8: F0 05             180          BEQ    D1           ;NO
80BA: A9 7C             181          LDA    #COPYPAGE-STRING
80BC: 20 13 81          182          JSR    OUTSTR
80BF: A9 71             183 D1       LDA    #SHOWPAGE-STRING
80C1: 20 13 81          184          JSR    OUTSTR
80C4: 60                185          RTS
                        186 *
                        187 *
80C5: A0 4F             188 ROTBITS  LDY    #79          ;SET INDEX
80C7: B9 91 82          189 CCB1     LDA    BUFF,Y       ;GET BYTE FROM BUFFER
80CA: 29 7F             190          AND    #%01111111   ;CLEAR COLOR BIT
80CC: 99 91 82          191          STA    BUFF,Y       ;PUT IT BACK
80CF: 88                192          DEY                 ;ALL DONE WITH ROW?
80D0: 10 F5             193          BPL    CCB1         ;NO, DO IT AGAIN
                        194
80D2: A9 00             195 RB1      LDA    #0           ;SET BUFFER INDEX AGAIN
80D4: 8D 06 80          196          STA    BYTE         ;
80D7: A0 4F             197 RB2      LDY    #79          ;POINT TO LAST BYTE OF BUFFER
                        198
80D9: A9 00             199 RB3      LDA    #0
```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```
80DB: 85 05     200          STA   TEMP1
80DD: B9 91 82  201          LDA   BUFF,Y      ;GET BYTE
80E0: 4A        202          LSR               ;SHIFT OUT BIT 0
80E1: 99 91 82  203          STA   BUFF,Y      ;PUT BYTE BACK
80E4: 66 05     204          ROR   TEMP1       ;PUT CARRY INTO TEMP1
80E6: 88        205          DEY
80E7: B9 91 82  206          LDA   BUFF,Y      ;GET NEXT BYTE DOWN
80EA: 05 05     207          ORA   TEMP1       ;STICK PREVIOUS CARRY INTO BYTE
80EC: 99 91 82  208          STA   BUFF,Y
80EF: CC 06 80  209          CPY   BYTE
80F2: D0 E5     210          BNE   RB3
                211
80F4: EE 06 80  212          INC   BYTE
80F7: AD 06 80  213          LDA   BYTE
80FA: C9 4F     214          CMP   #79
80FC: D0 D9     215          BNE   RB2
                216
                217  *
                218  ********************************
                219  *
                220  * USE FOLLOWING ROUTINE FOR LASERWRITER
                221  *
                222  ********************************
                223  *
80FE: A2 46     224  SENDBYTES LDX   #70
8100: A0 00     225  SB1       LDY   #0
8102: B9 91 82  226  SB2       LDA   BUFF,Y
8105: 8C 0A 80  227            STY   TMP1
8108: 20 52 81  228            JSR   OUTHEX
810B: AC 0A 80  229            LDY   TMP1
                230            INY
810E: C8        231            DEX
810F: CA        232            BNE   SB2
8110: D0 F0     233            RTS
8112: 60        234  *
                235  ********************************
                236  *
                237  * OUTPUT ROUTINES
                238  *
                239  ********************************
                240  *
8113: 8C 90 82  241  OUTSTR    STY   TMP
8116: A8        242            TAY
8117: B9 00 82  243  MO        LDA   STRING,Y
811A: C9 FF     244            CMP   #$FF
811C: F0 06     245            BEQ   M1
811E: 20 28 81  246            JSR   OUTBYTE
8121: C8        247            INY
8122: D0 F3     248            BNE   MO
8124: AC 90 82  249  M1        LDY   TMP
8127: 60        250            RTS
                251  *
8128: 48        252  OUTBYTE   PHA
8129: AD A9 C0  253  OB1       LDA   STATUS
812C: 29 10     254            AND   #%00010000  ;SEE IF ACIA TRANSMIT REG
812E: F0 F9     255            BEQ   OB1         ;     IS EMPTY AND READY FOR ANOT
HER
8130: AD A9 C0  256            LDA   STATUS      ;ACIA RECEIVE REG FULL?
8133: 29 08     257            AND   #%00001000
8135: F0 03     258            BEQ   OB2         ;EMPTY, SO BRANCH
8137: 20 43 81  259            JSR   CHECK       ;FULL, SO CHECK WHAT'S THERE
813A: 68        260  OB2       PLA               ;GET DATA BYTE BACK
813B: 8D A8 C0  261            STA   DATA
813E: 60        262            RTS
813F: 20 ED FD  263            JSR   $FDED       ;PUT NOP AT LINE 239 TO SEE
8142: 60        264            RTS               ;     BYTES SENT TO LASERWRITER
                265  *
                266  ********************************
                267  *
                268  * CHECK - CHECK FOR X-ON/X-OFF
                269  *
                270  ********************************
                271  *
8143: AD A8 C0  272  CHECK     LDA   DATA        ;GET DATA FROM ACIA
8146: C9 13     273            CMP   #19         ;X-OFF?
8148: D0 07     274            BNE   CHRTN       ;NO, SO BREAK OUT
814A: AD A8 C0  275  CH1       LDA   DATA        ;YES, SO CHECK FOR X-ON
814D: C9 11     276            CMP   #17         ;X-ON?
814F: D0 F9     277            BNE   CH1         ;NO, SO LOOP UNTIL IT IS
8151: 60        278  CHRTN     RTS               ;YES, SO EXIT
                279  *
                280  ********************************
                281  *
                282  * OUTHEX - CONVERT SCREEN DATA TO HEX STRINGS
                283  *
                284  ********************************
                285  *
8152: 48        286  OUTHEX    PHA               ;SAVE A
8153: 29 0F     287            AND   #$0F        ;CLEAR HIGH BITS
8155: A8        288            TAY               ;PUT REMAINDER IN Y INDEX
8156: B9 69 81  289            LDA   HEXTBL,Y    ;GET VALUE FROM HEX TABLE
8159: 20 28 81  290            JSR   OUTBYTE     ;SEND IT OUT
815C: 68        291            PLA               ;GET BACK ORIGINAL A
815D: 4A        292            LSR               ;SHIFT 4 TIMES
815E: 4A        293            LSR
815F: 4A        294            LSR
8160: 4A        295            LSR
```

```
8161: A8          296             TAY                 ;PUT IN Y INDEX
8162: B9 69 81    297             LDA   HEXTBL,Y      ;GET VALUE FROM HEX TABLE
8165: 20 28 81    298             JSR   OUTBYTE       ;SEND IT OUT
8168: 60          299             RTS
                  300  *
8169: 30 38 34    301  HEXTBL     ASC   '084c2a6e195d3b7f'
816C: 63 32 61 36 65 31 39 35
8174: 64 33 62 37 66
                  302  *
                  303  * THE HEX TABLE IS SCRAMBLED BECAUSE THE APPLE SCREEN
                  304  * BYTES READ LOW BIT ON THE LEFT.  THIS RESULTS
                  305  * IN THE LASERWRITER NEEDING THE MIRROR IMAGE
                  306  * OF THE VALUE TAKEN FROM THE SCREEN.
                  307  *
                  308  BLANK1     EQU   *
                  309  *
8179: 00 00 00    310             DS    $81E0-BLANK1
817C: 00 00 00 00 00 00 00 00
8184: 00 00 00 00 00 00 00 00
818C: 00 00 00 00 00 00 00 00
8194: 00 00 00 00 00 00 00 00
819C: 00 00 00 00 00 00 00 00
81A4: 00 00 00 00 00 00 00 00
81AC: 00 00 00 00 00 00 00 00
81B4: 00 00 00 00 00 00 00 00
81BC: 00 00 00 00 00 00 00 00
81C4: 00 00 00 00 00 00 00 00
81CC: 00 00 00 00 00 00 00 00
81D4: 00 00 00 00 00 00 00 00
81DC: 00 00 00 00
                  311  *
                  312  **********************************
                  313  *
                  314  * SCREEN MOVE ROUTINES
                  315  *
                  316  **********************************
                  317  *
                  318  * SEC - MOVE MAIN TO AUX
                  319  * CLC - MOVE AUX TO MAIN
                  320  *
                  321  * THIS ROUTINE NEEDS DECIMAL VALUE OF SEC (56 DEC)
                  322  * OR CLC (24 DEC) TO SET THE DIRECTION OF THE MOVE.
                  323  * IT MOVES BOTH HIRES PAGES ($2000-$5FFF) AT ONCE.
                  324  *
                  325  *
81E0: A9 00       326  2M2AUX    LDA   #$00          ;CALL 33248 FROM BASIC
81E2: A2 20       327             LDX   #$20
81E4: 85 3C       328             STA   A1L
81E6: 85 42       329             STA   A4L
81E8: 86 3D       330             STX   A1H
81EA: 86 43       331             STX   A4H
81EC: A9 FF       332             LDA   #$FF
81EE: A2 3F       333             LDX   #$3F
81F0: 85 3E       334             STA   A2L
81F2: 86 3F       335             STX   A2H
81F4: 38          336             SEC                 ;POKE 24 OR 56 FROM BASIC (33268)
81F5: 20 11 C3    337             JSR   AUXMOVE
81F8: 60          338  RTSMOV     RTS
                  339  *
                  340  ******************************************************
                  341  *
                  342  BLANK2     EQU   *
                  343
81F9: 00 00 00    344             DS    $8200-BLANK2
81FC: 00 00 00 00
                  345
                  346  STRING     EQU   *             ;STRINGS START AT $8200
                  347
8200: 00 00 00    348  TRANSMAT   DS    32            ;TRANSFORMATION MATRIX (33280)
8203: 00 00 00 00 00 00 00 00
820B: 00 00 00 00 00 00 00 00
8213: 00 00 00 00 00 00 00 00
821B: 00 00 00 00 00
8220: 00 00 00    349  TRANSLATE DS    32            ;TRANSLATE STRING (33312)
8223: 00 00 00 00 00 00 00 00
822B: 00 00 00 00 00 00 00 00
8233: 00 00 00 00 00 00 00 00
823B: 00 00 00 00 00
8240: 00 00 00    350  SCALE     DS    16            ;SCALE STRING     (33344)
8243: 00 00 00 00 00 00 00 00
824B: 00 00 00 00 00
8250: 00 00 00    351  SLENGTH   DS    8             ;SCAN LINE LENGTH (33360)
8253: 00 00 00 00 00
8258: 00 00 00    352  LINES     DS    8             ;LINES            (33368)
825B: 00 00 00 00 00
8260: 00 00 00    353  BITSPER   DS    8             ;BITS/SAMPLE      (33376)
8263: 00 00 00 00 00
8268: 3E 7D 69    354  ENDARRAY  ASC   '>}image '     ;STRING AT END OF ARRAY
826B: 6D 61 67 65 20
8270: FF          355             DFB   $FF           ;STRING DELIMITER
8271: 20 73 68    356  SHOWPAGE  ASC   ' showpage '
8274: 6F 77 70 61 67 65 20
827B: FF          357             DFB   $FF           ;STRING DELIMITER
827C: 20 20 7B    358  COPYPAGE  ASC   '  {copypage}repeat '     ;(33404)
827F: 63 6F 70 79 70 61 67 65
8287: 7D 72 65 70 65 61 74 20
```

Listing 2 — Continued on page 66

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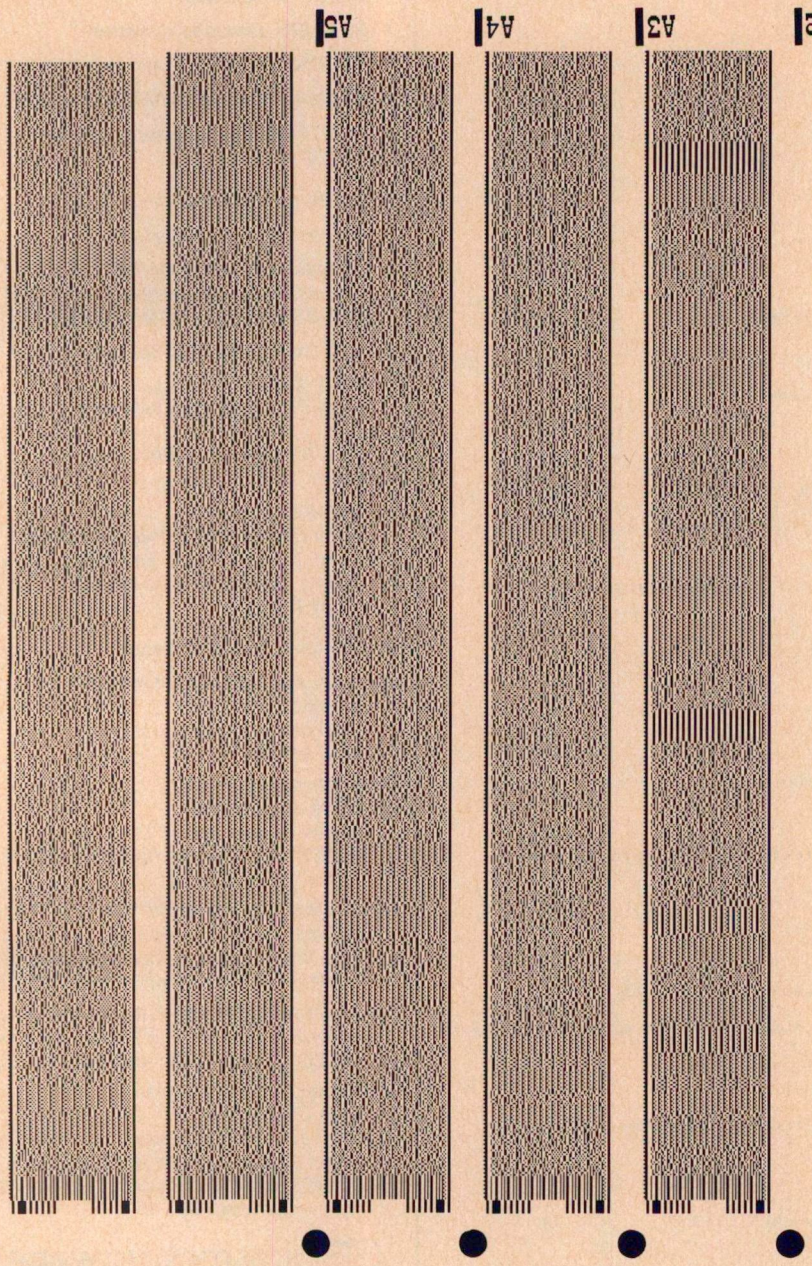

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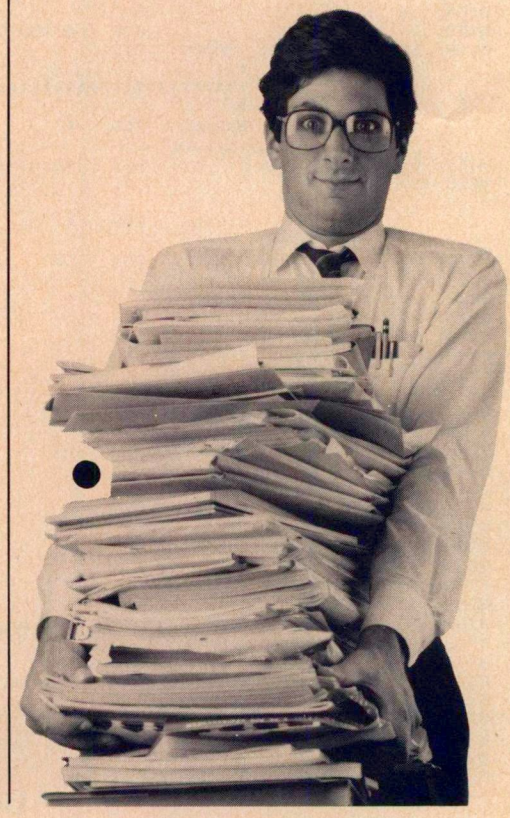

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more complete control over error situations

G — INVERSE (January, 1986)
printing out unprintable catalog titles

H — ProDOS MACROS (January, 1985)
introduction to the ProDOS machine language interface

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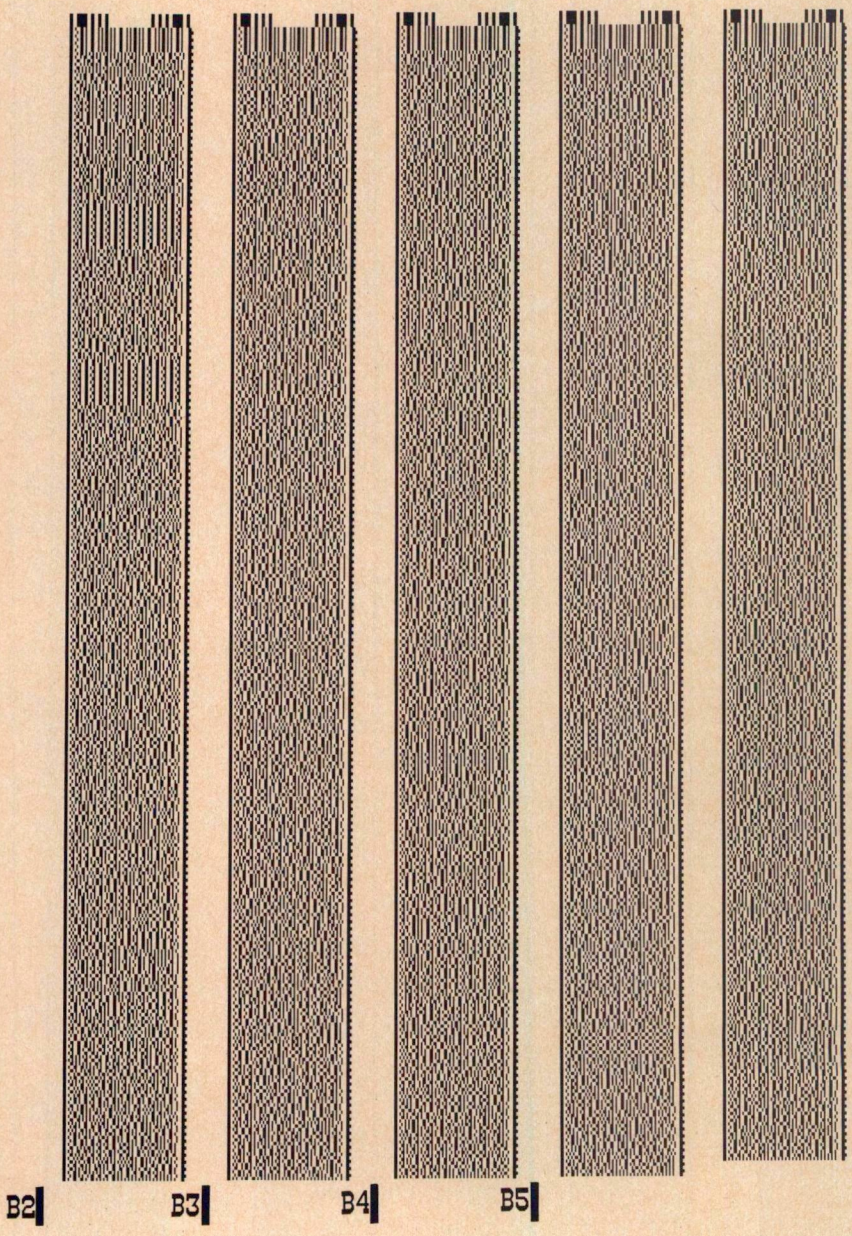

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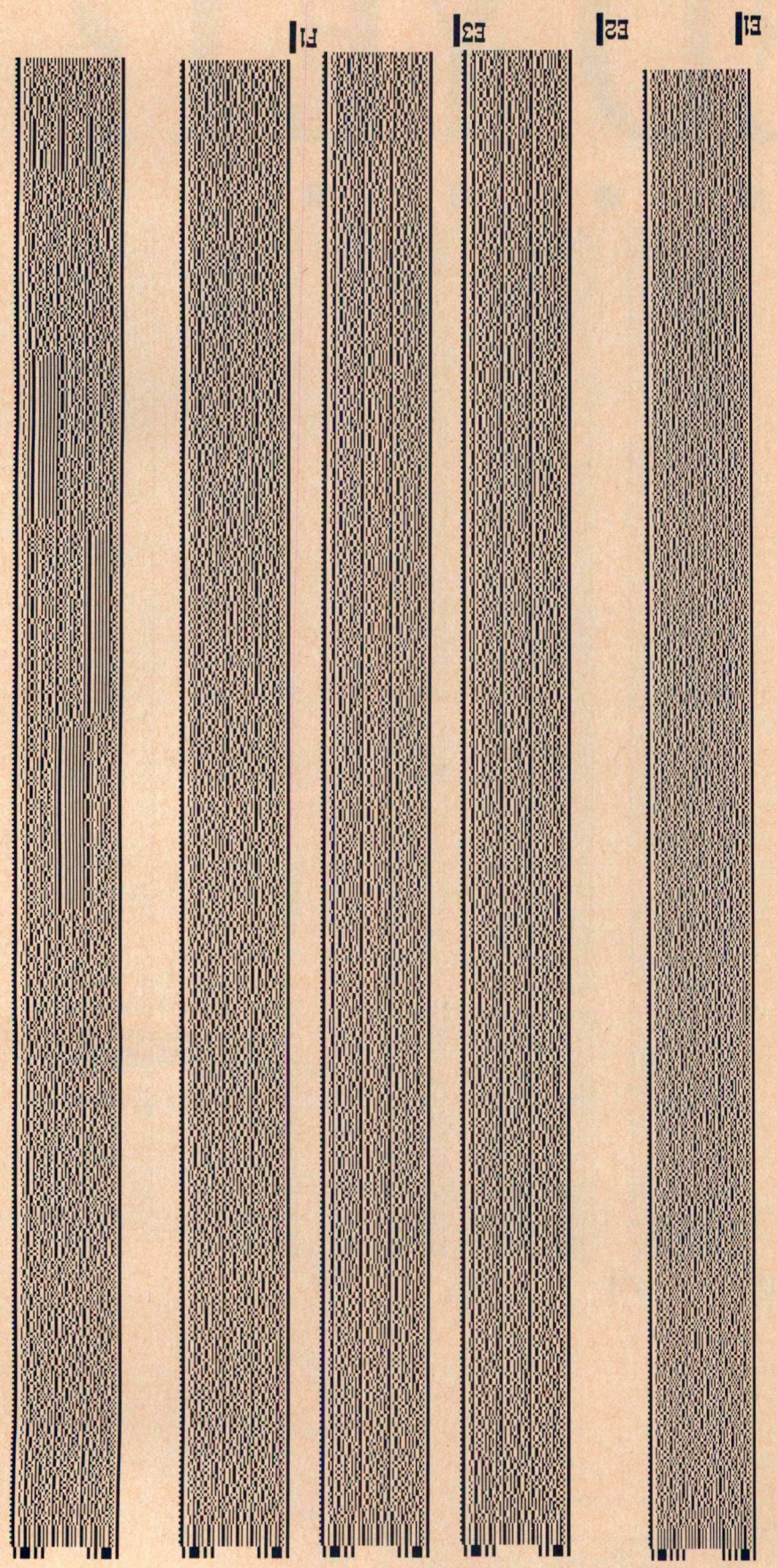
StripWare Library Nos. 282-289



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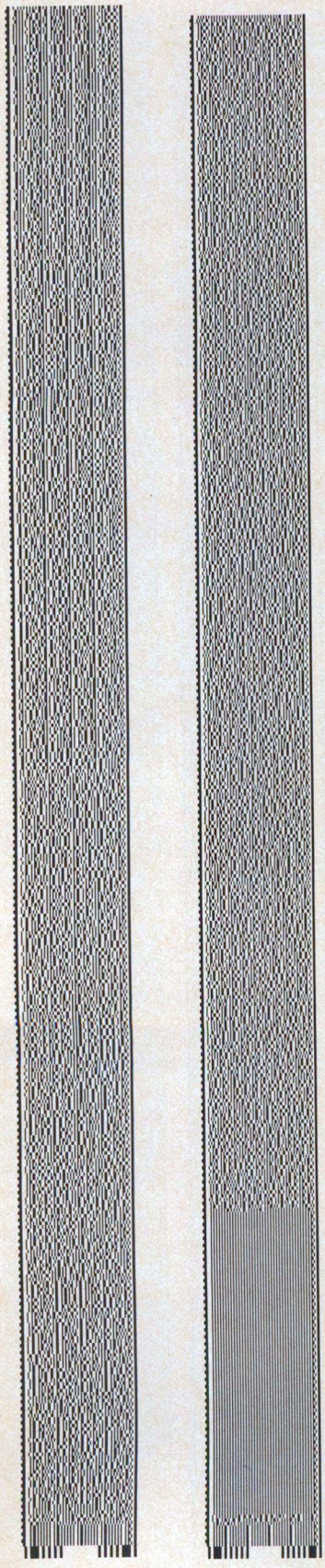
G1

H1 H2 H3 H4



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Softstrip
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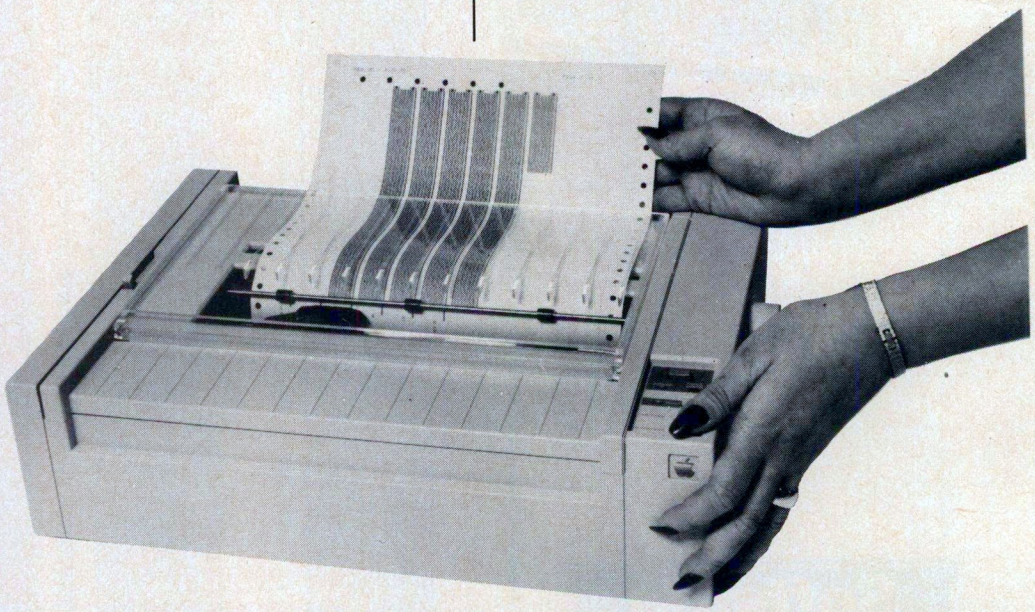

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pfs: file to ProDOS ASCII Converter

Wes Felty

SOME of the new data base programs allow you to transfer your files to ASCII files so that they can be easily transported to other programs or computers. Unfortunately, *pfs:file* is not one of them. After deciding to transfer my *pfs:file* programs to AppleWorks files and to a Mac computer, I created Provert.2. (Provert.1, published in the March 1986 *Call -A.P.P.L.E.*, translates *pfs:write* files to ASCII). These files can be used by either the AppleWorks word processor or its data base. I will also give a description of how *pfs:file* stores its data.

How to Use PROVERT.2

PROVERT.2 has control menus to guide you through its operation, but here are more details. It can be used with one disk drive or two, but with one drive you will be doing a lot of disk switching. To reduce the amount of switching if your files are very complex, you can use Option 1 in *pfs:file* to redesign the form. You don't need to actually change the form at all, but by going through the redesign form procedure, your files get stored in a much more orderly fashion which PROVERT.2 can read with less disk swapping. This is particularly helpful if you have added material to records after they were originally created and the records are somewhat long.

The length of the converted ProDOS file can be quite a bit longer or shorter than the original *pfs:file* due to the difference in the way that the two different systems store their data. If your *pfs:file* records are short and compact, with only a few fields and few carriage returns, then the ProDOS ASCII file produced by PROVERT.2 will be much shorter. But if you space the *pfs:file* data all over the page with carriage returns, down arrows, or spaces, then the ProDOS ASCII file will be longer than the original pfs file. This is due to the fact that the ProDOS ASCII file has to insert the actual spaces into the text while the pfs file compresses the multiple spaces in a three byte code.

One option that you have to decide on is whether to create a standard ProDOS file or an AppleWorks data base file. There are five primary differences when using the data base option. This option shortens each field down to 76 characters, which is the maximum that AppleWorks data base categories can use. Multiple spaces are shortened down to one space. Attachments, if any, are ignored. In the ASCII file format, two blank lines are inserted between records for easier readability. And, with the standard ProDOS ASCII file, the converted file may be stored in more than one text file with ".1," ".2," etc. appended on the end of the file name. Shortening the fields compresses the data and makes it easier to get on the ProDOS disk. Dropping the multiple spaces allows more of the data to fit within the AppleWorks 76 character fields. An attachment would be mistaken for the next category and therefore throw off all of the following records causing data to go into the wrong categories. The ASCII file format, with all of the spaces built in, could easily produce text files that are too large to put into a 55K Desktop.

AppleWorks can actually use both the ASCII format and the Data Base format converted files in either its word processor or data base. But again, if the ASCII format has any attachment pages, it can throw off the data base categories for all records past the attachment. You can load the ASCII file into the AppleWorks word processor, edit it, and use the clip board to transfer it over to the data base.

You can easily tell from the CATALOG of the data disk whether a converted file is in the ASCII or data base format since ".ASC" or ".DB.number" is appended to the end of the file names, respectively. The number on the end of the "DB" file is the number of categories. (You need to know this number when you load the file into AppleWorks). If you load the ASCII formatted file into the AppleWorks data base, then you need to use a number that is two larger than the actual number of categories, since the ASCII format includes two blank lines after each record. The two blank categories can be easily deleted from within AppleWorks. Also, the first data stored on either type of converted file is a list of the category names so that you can easily change the AppleWorks categories and then delete out the first record if you wish.

When setting up data disks to store the converted files, it is best to simply format them with the ProDOS filer program and not store "PRODOS" "BASIC.SYSTEM," etc. on them. These programs are not needed on a data disk and take up valuable room. Some converted ASCII files will take up a tremendous number of blocks. Be sure to write the disk's volume name on its label, since AppleWorks will ask for it when it loads the converted files. *Caution*! Please write protect the *pfs:file* disk before using PROVERT.2, especially if using a single disk drive. Getting the disks mixed up could ruin the data on the *pfs:file* disk.

PFS:FILE Data Structure

Pfs:file does not use a normal disk format for storing its data. The format does not even resemble the format for *pfs:write* files. There is a simple reason for this. *Pfs:file* does not need and cannot use a catalog disk structure. Its DOS doesn't need to find, load, and save individual records as much as it needs to find search strings in different fields. A *pfs:file* data disk is formatted to contain up to 1056 records. A ProDOS type catalog would take up half of the disk just to refer to data in one field of each record. And, even that structure would not support searches for data in several fields at the same time.

Pfs:file stores its data using a doubly

linked record system. At the beginning of each record are links, disk addresses, to the next record and the last record. Also, within each record, there are links or offsets from each field to the next field. This is somewhat similar to Applesoft program lines which always start with the address where in memory the next line starts. At the end of each "page" of data, there is a link (address) to the next page of continuing data. In this way, *pfs:file* can easily move forward or backward through record by record, field by field. This linked list technique makes it easy for *pfs:file* to search each record for multiple field search strings. But it isn't too fast. For fast searches of the first field, *pfs:file* stores the first eight characters of each record along with the record's starting address on disk on blocks 1-15. That is how it can do a search of the whole disk for the first field in two seconds. It is only comparing the first eight characters over fifteen blocks, not 264 blocks.

The data itself is stored on the disk with its high bit set in 128 byte "pages." These one quarter sector, one half block pages are stored on Pascal formatted blocks, so a ProDOS disk zap program like Pro-Zap or Pro-Byter can easily read them. Block 0 holds the basic information, such as where the last file begins and how

TABLE 1

Table 1...Block 0

Byte	Characteristic
0, 1	Starting page of category field names
2, 3	Ending page of category field names
4, 5	Number of pages in designed form
6, 7	Total number of records
8, 9	Start of last record written to disk
10, 11	Last block that can be written to ($117)
14, 15	A page that pfs:file uses for its own book keeping
86	Number of characters in volume name
87-94	Name of volume (maximum of 8 characters)
98, 99	Block number of a title page
100, 101	Block number of a "SEARCH SUBJECTS" page
102, 103	Number of blocks on the disk ($118)

TABLE 2

Normal Data Page Structure

Byte	Characteristic
0, 1	Page number of additional overflow data written after following records created if any
6, 7	Record Number
8, 9	Page Where Next Record Starts
10, 11	Page Where Previous Record Started.
12, 13	Offset link to next link. Reaching zero means end of record This number does NOT include the last two bytes of the page if the next link is on another page.
14	Column of where the first fields starts Printing.
15	Row of where the first field starts printing.For 80 column records, the high bit is set for the row, so row 0 shows up as $80 and row 10 shows up as $8A.
16-125	Record's data.
126, 127	Page number of where data continues.

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- A/D process totally transparent to Apple (looks like memory)
- User programmable input ranges are 0 to 10 volts, 0 to 5, −5 to +5, −2.5 to +2.5, −5 to 0, −10 to 0.

The A/D process takes place on a continuous, channel sequencing basis. Data is automatically transferred to its proper location in the on-board RAM. No A/D converter could be easier to use.

D/A SPECIFICATIONS

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- On-board output buffer amps can drive 5 MA
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- User programmable output ranges are 0 to 5 volts and 0 to 10 volts

The D/A section contains 8 digital to analog converters, with output buffer amplifiers and all interface logic on a single card. On-card latches are provided for each of the eight D/A converters. No D/A converter could be easier to use. The on-board amplifiers are laser-trimmed during manufacture, thereby eliminating any requirement for off-set nulling.

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- 4.5" square for standard card cage and 4 mounting holes for standard mounting. The signal conditioner does not plug into the Apple, it can be located up to ½ mile away from the A/D.
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many blocks can be written to. See Table 1. If a person could get *pfs:file* transferred to a hard disk, he would probably want to change bytes 102 and 103 on Block 0 to get more records.

The category names are stored starting at page $40 (64), block $10 (16). The records themselves start on the first available page following the category names. The last two bytes of each page hold a link to the next continuing page if the record needs additional pages in a low-byte-high-byte page number address format. When a record is finished, these two link bytes are changed to zeros. These links originally point to the next page, but if you came back later and add data to a record, then the link points to the next available page. The first two bytes of the first page of a record point to the page number of the first attachment page, if any. The first two bytes of each attachment page point to the page number of any following attachments. See Table 2 and Table 3 for more details.

Therefore, here is how *pfs:file* records are stored on the disk. Each new record starts on a new 128 byte page. The page number of an attachment page, if any, is written in the first two bytes. Bytes six and seven contain the number of the record. Bytes eight and nine contain the page number where the next record starts. Bytes 10 and 11 contain the address where the previous record was stored. Bytes 12 and 13 contain the first offset, the distance in memory where the next field starts. The next two bytes contain the column and row of where to start printing the data on the screen or printer. Then follows the data. The data field ends with a zero following with the offset to the next field, if any. If the data overflows the 128 byte page, then the last two bytes contain the page number where the data continues. If these last two bytes are zeros, then *pfs:file* checks the first two bytes of the record to see if there is an attachment page. The data is stored in the same general manner on the attachment page, and its first two bytes also contain the address of another additional attachment page, if any. Therefore, all of the records are strung together by the page links.

Pfs:file has an interesting way of compressing blank spaces. Any time there are more than three adjacent blank spaces, *pfs:file* compresses the data to "01 XX A0." "01" is a token telling that spaces follow. "XX" is the number of spaces, and "A0" is the ASCII code for a blank space. If you hit carriage returns or down arrows to space down to a lower line to write data on, *pfs:file* adds up all of the spaces, 40 or 80 per line depending on 40 or 80 column display. If more than 255 spaces are needed, *pfs:file* just repeats the compressed code. For example, if you spaced down six and one half lines with 80 column display, then 520 spaces would be encoded as "01 FF A0 01 FF A0 01 0A A0".

TABLE 3

Table 3...Attachment Page Structure

Byte	Characteristic
0, 1	Page number of next attachment, if any
2, 3	Page number of last record or page
4, 5	Actual page number of record
6, 7	First field's offset
8, 9	Column and row for the first field
10-125	Record's data
126, 127	Link, if any, to the next page of data for this attachment page

LISTING 2

Program Listing...PROVERT.2

```
1000  IF  PEEK (104) <  > 68 THEN  POKE 104,68: POKE 17408,0: POKE
      17409,0: POKE 17410,0: PRINT  CHR$ (4)"RUN PROVERT.2": REM
      RELOCATE PROGRAM UP TO PAGE 68
2000  GOTO 8000
3000  REM             SUBROUTINE TO BUILD IN SPACES

3010  IF P1 + YZ = 128 * (SP + 1) - 3 THEN FLAG = 1:PL =  PEEK (BU +
      P1 + YZ + 1) + 256 *  PEEK (BU + P1 + YZ + 2): GOSUB 4010:YZ =
      YZ + 2:SS =  PEEK (BU + 128 * SP):P1 = 128 * SP - YZ + 1: IF
      NOT AW THEN  FOR QW = 1 TO SS: PRINT " ";: NEXT
3020  IF FLAG <  > 1 AND P1 + YZ = 128 * (SP + 1) - 4 THEN FLAG =
      1:SS =  PEEK (BU + P1 + YZ + 1):PL =  PEEK (BU + P1 + YZ + 2) +
      256 *  PEEK (BU + P1 + YZ + 3): GOSUB 4010:YZ = YZ + 2:P1 = 128
      * SP - YZ + 1: IF  NOT AW THEN  FOR QW = 1 TO SS: PRINT " ";:
      NEXT
3030  IF DB THEN  PRINT " ";: IF  NOT FLAG THEN YZ = YZ + 2: RETURN
3040  IF FLAG THEN FLAG = 0: RETURN
3050 SS =  PEEK (BUFFER + P1 + YZ + 1):YZ = YZ + 2: IF  NOT DB THEN
      FOR QW = 1 TO SS: PRINT " ";: NEXT
3060  RETURN
4000  REM           SUBROUTINE TO FIND CORRECT PAGE

4010 HFLAG = 0: IF (PL >  = 4 * BL AND PL <  = 4 * BH) THEN SP = PL -
      64 - 112 * CY:P1 = 128 * SP - YZ: RETURN : REM  CHECK IF NEXT
      SUB-PAGE IS ALREADY IN MEMORY
4020 HFLAG = 1: IF DIN = DOUT THEN MS$ = RD$: GOSUB 7010
4030 BF = 66:B1 =  INT ((PL) / 4):SN = PL - 4 * B1: GOSUB 5030:P1 =
      256 * 58 + 128 * SN - YZ:SP = 2 * 58 + SN: IF DIN = DOUT THEN
      MS$ = WR$: GOSUB 7010
4040  RETURN
5000  REM           READ DIRECTLY FROM DISK ROUTINE

5010  IF DIN = 1 THEN  POKE 778,D1
5020  IF DIN = 2 THEN  POKE 778,D2
5030  POKE 780,BF
5040 LO = B1: IF B1 > 255 THEN LO = B1 - 255:HI = 1
5050  POKE 781,LO: POKE 782,HI
5060  CALL 768
5070  RETURN
6000  REM           WRITE MESSAGE TO SCREEN

6010  IF (DIN = DOUT) AND (CYCLE > 0) THEN  HOME : VTAB 12:MS$ = WR$:
      GOSUB 7010: HOME :MS$ = "Working...Please stand by": FOR ZZ = 1
      TO 25: POKE 1703 + ZZ, ASC ( MID$ (MS$,ZZ,1)) + 128: NEXT
6020  IF CYCLE > 0 THEN  PRINT  CHR$ (4)"WRITE "NN$: RETURN
6030  HOME : VTAB 12: PRINT "Working...Please Stand By."
6040  PRINT  CHR$ (4)"OPEN "NN$",D"DOUT
6050  PRINT  CHR$ (4)"WRITE "NN$
6060  RETURN
7000  REM          SCREEN MESSAGE POKER ROUTINE

7010  HOME :LN =  LEN (MS$): FOR ZZ = 1 TO LN:Z1 = 1704 + ZZ - 1:LT =
      ASC ( MID$ (MS$,ZZ,1)): IF LT = 32 THEN LT = 96
7020  POKE Z1,LT: NEXT : CALL  - 678: RETURN

7030  IF PEEK (-16384) <  128 THEN 7030
7040  POKE -16386,0: RETURN
8000  REM
                        INITIALIZATION

8010 RD$ = "INSERT THE PFS DISK AND PRESS RETURN    ":WR$ = "INSERT
      THE PRODOS DISK AND PRESS RETURN"
8020  TEXT : HOME :A$ = "PFS file --> ASCII CONVERTER": PRINT  SPC(
      20 - ( INT ( LEN (A$) / 2)))A$: PRINT : PRINT : PRINT "This
      program will convert PFS FILE's to a ProDOS ASCII file (name.#
      Categories) so that AppleWorks can use it."
8030  PRINT : PRINT : PRINT "Since AppleWorks categories can only be
      76 characters long, each entry may be  shortened if you pick
      that option.": PRINT : PRINT
8040  FOR ZZ = 0 TO 25: READ Z: POKE 768 + ZZ,Z: NEXT : DATA
      32,0,191,128,9,3,208,8,96,3,224,0,8,16,0,96,32,218,253,32,58,255
      ,32,190,253,96
8050  PRINT "Which disk drive to read PFS from?";: GET DIN$: PRINT
      DIN$: PRINT : PRINT "Which disk drive to write ASCII files
      to?";: GET DOUT$:DIN =  VAL (DIN$):DOUT =  VAL (DOUT$): PRINT
      DOUT$
```

```
9090  IF (DIN < 1 OR DIN > 2) OR (DOUT < 0 OR DOUT > 2) THEN  PRINT
      CHR$ (7) CHR$ (7): HOME : GOTO 8050 ,
9100  PRINT : PRINT "Do you wish to create an AppleWorks database
      file? Each field will be shortened to 76 characters and
      Attachments will beignored. ":DB = 1: GET DB$: IF  LEFT$
      (DB$,1) <  > "Y" THEN DB = 0
9110  HOME : VTAB 12: PRINT "Place the PFS file disk in drive # "DIN
9120  IF DOUT <  > DI THEN  PRINT "and the disk to write to in drive
      #"DOUT
9130  PRINT "and press any key to continue!": GET ZZ$
9140  HOME : VTAB 12: PRINT "Working...Please Stand By."
9150 BUFFER = 2048:D1 = 96:D2 = 224:HI = 0: REM

                GET PFS.FILE TITLE

10000 B1 = 0:BF = 8:BR = 66: GOSUB 5010:NM$ = ""
10010  IF  PEEK (BU + 102) + 256 *  PEEK (BU + 103) <  > 280 THEN
      PRINT  CHR$ (7)"The disk in the drive is NOT a PFS:FILEdisk.
      Insert the proper disk and press any key to continue. ": GET
      ZZ$: GOTO 9110
10020 LN =  PEEK (BUFFER + 86): FOR ZZ = 1 TO LN:A =  PEEK (BUFFER +
      86 + ZZ):NM$ = NM$ +  CHR$ (A): NEXT
10030 NO =  PEEK (BU + 6) + 256 *  PEEK (BU + 7)
10040 HB =  INT (( PEEK (BU + 8) + 256 *  PEEK (BU + 9) + 1) / 4 +
      .8): REM    LAST BLOCK USED + 1
10050 PG =  PEEK (BU + 4) + 256 *  PEEK (BU + 5)
10060  TEXT : HOME : PRINT "PFS File => "NM$;: HTAB 27: PRINT "RECORD
      # 000": PRINT "NUMBER OF RECORDS = "NO: IF PG > 1 THEN  PRINT
      "NUMBER OF PAGES IN EACH RECORD = "PG: REM
                    DISK READ ROUTINE

20000  POKE 34,4: VTAB 12: PRINT "Working...Please Stand By."
20010 BL = 16:BH = 44:BF = 8: REM  ORIGINAL PARAMETERS
20020  IF BH > HB THEN BH = HB: REM  READ DISK ENTRY POINT
20030  FOR B1 = BL TO BH: GOSUB 5030:BF = BF + 2: NEXT : REM

            GET NUMBER OF CATEGORIES

30000 CT = 0:SP = 0:P1 = 12
30010 AA =  PEEK (BU + 128 * SP) + 256 *  PEEK (BU + 128 * SP + 1)
30020 OFF =  PEEK (BUFFER + P1) + 256 *  PEEK (BU + P1 + 1)
30030 P1 = P1 + OFF
30040  IF P1 > 128 * (SP + 1) - 2 THEN SP = SP + 1:P1 = P1 + 2: IF P1
      > 128 * (SP + 1) - 2 THEN 30040
30050  IF OFF <  > 0 THEN CT = CT + 1: GOTO 30020
30060  IF AA <  > 0 THEN SP = AA - 64 - 112 * CY:P1 = 128 * SP + 5:
      GOTO 30010
30070 LP =  INT (P1 / 128): REM  LAST PAGE OF CATEGORIES
30080  IF  NOT DB THEN NN$ =  LEFT$ (NM$,11) + ".ASC"
30090  IF DB THEN NN$ =  LEFT$ (NM$,11 -  LEN ( STR$ (CT))) + ".DB."
      +  STR$ (CT)
30100  IF DIN = DOUT THEN  HOME : VTAB 12: PRINT "Put the ProDOS data
      disk in the drive  and press RETURN": CALL  - 676
30110  GOSUB 6030:Z = 0:P1 = 12:SP = 0: REM

              READ CATeGORIES

40000 AA =  PEEK (BU + Z) + 256 *  PEEK (BU + Z + 1)
40010  FOR Z = 1 TO CT
40020 OFF =  PEEK (BUFFER + P1) + 256 *  PEEK (BU + P1 + 1)
40030  IF OFF = 0 THEN K = 128 * (AA - 64 - 112 * CY):AA =  PEEK (BU
      + K):P1 = K + 6:OFF =  PEEK (BU + P1) + 256 *  PEEK (BU + P1 +
      1)
40040  FOR YZ = 4 TO OFF - 1
40050 A =  PEEK (BUFFER + P1 + YZ): IF BU + P1 + YZ >  = 512 * (4 +
      BH) THEN  GOSUB 55010
40060  IF P1 + YZ = 128 * (SP + 1) - 2 THEN SP = A + 256 *  PEEK (BU
      + P1 + YZ + 1) - 64 - 112 * CY:P1 = SP * 128 - YZ: GOTO 40050
40070  IF A > 159 AND A < 256 THEN  PRINT  CHR$ (A - 128);
40080  IF A = 1 THEN  GOSUB 3010
40090  NEXT : PRINT
40100 P1 = P1 + OFF
40110  NEXT :Y1 = 1: POKE 1061,177:SP = LP + 1: IF  NOT DB THEN
      PRINT : PRINT : REM
              READ FILES

50000 P1 = 128 * SP + 12
50010 PN =  PEEK (BUFFER + P1 - 4) +  PEEK (BU + P1 - 3) * 256 - 64 -
      112 * CY
50020 AA =  PEEK (BU + 128 * SP) + 256 *  PEEK (BU + 128 * SP + 1)
50030 OFF =  PEEK (BUFFER + P1) + 256 *  PEEK (BU + P1 + 1)
50040  IF OFF = 0 THEN 50160
50050  FOR YZ = 4 TO OFF - 1
50060 A =  PEEK (BU + P1 + YZ)
50070  IF P1 + YZ = ((SP + 1) * 128) - 2 THEN PL = A + 256 *  PEEK
      (BU + P1 + YZ + 1): GOSUB 4010: GOTO 50060
50080  IF  NOT DB THEN 50110
50090  IF YZ < 80 AND A > 159 AND A < 256 THEN  PRINT  CHR$ (A -
      128);
50100  GOTO 50120
50110  IF A > 159 AND A < 256 THEN  PRINT  CHR$ (A - 128);
50120  IF A = 1 THEN  GOSUB 3010
50130  NEXT : PRINT : IF P1 + OFF = ((SP + 1) * 128) - 2 THEN PL =
      PEEK (BU + P1 + OFF) + 256 *  PEEK (BU + P1 + OFF + 1): GOSUB
      4010:P1 = P1 + YZ:OFF =  PEEK (BU + P1) + 256 *  PEEK (BU + P1
      + 1): GOTO 50040
```

How to Load ASCII Files into AppleWorks

After PROVERT.2 converts a *pfs:file* disk to an ASCII format or data base format ProDOS disk, the files are both actually ASCII. You must use a special method to load either one into AppleWorks. This can be a little tricky if you aren't too familiar with ProDOS pathnames and ASCII files.

Pick these options starting from the AppleWorks main menu

1. Add files to the Desktop
   Make a new file for the:
3. Word Processor or 4. Data Base
   Make a new file
2. From a Text (ASCII) file
   For a data base file, you will be asked for the number of categories at this point. The number of categories is appended to the end of the converted ".DB." file's name. For a converted ".ASC" file, add two to the number of actual categories.

   Pathname?. . . you need to know the name of the disk volume that the ASCII file is on and the exact name of the file. You can find them back in AppleWorks' very first menu by taking options
5. Other operations
2. Display current disk directory.

After loading the ASCII file, save it in the normal AppleWorks manner and the file will then be a normal AppleWorks file.

How PROVERT.2 Works

How PROVERT.2 works is easy to understand, but not at all easy to create. It reads 28 blocks of data at a time directly from the *pfs:file* disk with a disk zap type routine, (lines 5000-5070), into a large buffer, ($800-$4400 in memory), PEEKs out the actual text (lines 50000-50260), and writes the text to the ProDOS data disk using normal text file OPEN, WRITE, and PRINT commands (lines 6020-6050 & 50080-50110). The large disk read buffer is created by relocating the Applesoft BASIC program up from its normal position of $800 to $4400 by line 1000. This protects the data from variables and strings overwriting it. To prevent the screen messages to change disks for single drive operation from being written into the disk text, the messages are POKEd directly onto the screen (lines 7000-7040). Since parts of some of the records might not be within the blocks originally read, a smaller buffer ($4200-$43FF) is reserved for reading overflow data.

The data is read from the *pfs:file* disk by calls to the ProDOS Machine Language Interface (MLI). First of all, block 0 is read

Continued on pg. 42

Review of "COMPUTEREYES"

Product:	COMPUTEREYES Video Acquisition System	
Use:	Digitizing Television Pictures	
For:	Apple II, II+, IIc	
Company:	Digital Vision, Inc.	
	14 Oak Street, Suite 2	
	Needham, MA 02192	
Price:	Basic package, less camera	$129.95
	with camera and cable	$399.95

Jim Hockenhull

A video digitizer is a gadget that takes a television picture and converts it into a computer graphics image. Eliminating the need for drawing skills, it makes the acquisition of realistic pictorial information about as simple as possible. Video digitizers have been available for the Apple II family for a long time, but in the past they were expensive and often less than satisfactory. All this has been changed by the COMPUTEREYES Video Acquisition System from Digital Vision, Inc. I've been using COMPUTEREYES since mid-1984; I'd like to pass along my impressions to the readers of *Call -A.P.P.L.E.*

Description

COMPUTEREYES is an integrated system of hardware and software. It translates a standard video signal into an Apple hi-res image. Input is ordinarily from a camera, but might also come from a VCR (video cassette recorder), the Video Out jack of a modern television set, or even from another computer. The input signal is fed into a phono jack on the small black box that comprises the COMPUTEREYES hardware. It is then passed to the Apple through the 16-pin Game I/O socket on the computer's motherboard. No expansion slots are used. On the front of the black box are two knobs, one to synchronize the system to the video input signal, the other to adjust the brightness of the computer image.

Software, provided on a single DOS 3.3 disk, consists of a kernel of machine-code routines presided over by an Applesoft executive program, the part that the user sees. This executive displays a menu of ten user options—largely self-explanatory—which control the initial setup, the acquisition of several types of images, and the saving and loading of images on disk. COMPUTEREYES works with one or two disk drives.

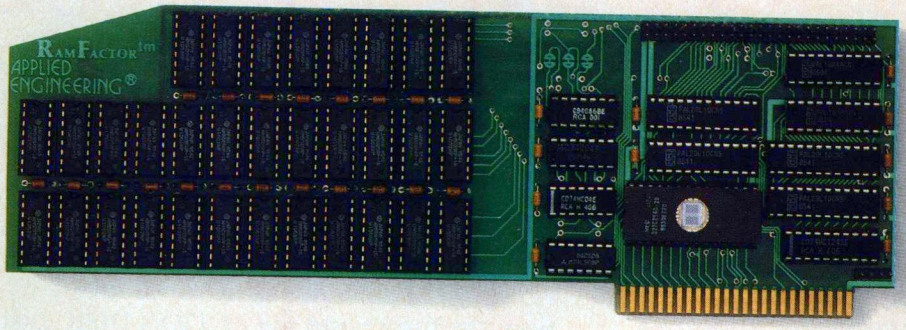
Installation is simplicity itself: the cable from the black box is connected to the Apple's Game I/O socket, an appropriate video source is plugged into the black box, and the system disk is booted, presenting the menu of options. Digital Vision sells a simple black and white video camera for those who need one. (See Figure 1.)

RamFactor™

All the Performance, Speed, and Software Compatibility of RamWorks™ in a Slot 1 through 7 Card.

That's right! Now Applied Engineering offers you a choice. While RamWorks is the clear winner for the auxiliary slot in a IIe, RamFactor is the standard for slots 1 through 7. Now anyone with an Apple II+, Franklin, or Apple IIe preferring to use slots 1 through 7 can now enjoy the speed and performance that until now was only available with RamWorks.

With RamFactor, you'll be able to instantly add another 256K, 512K, or a full 1 meg on the main board and up to 16 meg with additional piggyback card. And since virtually all software is automatically compatible with RamFactor, you'll immediately be able to load programs into RamFactor for instantaneous access to information. You'll also be able to store more data for larger word processing documents, bigger data bases, and expanded spreadsheets.



Very Compatible

All the leading software is already compatible with RamFactor. Programs like AppleWorks, Pinpoint, BPI, Managing Your Money, Dollars and Sense, SuperCalc 3A, PFS, MouseWrite, MouseDesk, MouseCalc, Sensible Speller, Applewriter IIe, Business Works, ReportWorks, Catalyst 3.0 and more. And RamFactor is fully ProDos, DOS 3.3, Pascal 1.3 and CP/M compatible. In fact, no other memory card (RamWorks excepted) is more compatible with commercial software.

AppleWorks Power

There are other slot 1-7 cards that give AppleWorks a larger desktop, but that's the end of their story. But RamFactor is the only slot 1-7 card that increases AppleWorks internal memory limits, increasing the maximum number of lines permitted in the word processor, and RamFactor is the only standard slot card that will automatically load AppleWorks into RAM dramatically increasing speed and eliminating the time required to access the program disk, it will even display the time and date on the AppleWorks screen with any ProDos clock. RamFactor will automatically segment large files so they can be saved on 5¼", 3½", and hard disks. All this performance is available to anyone with an Apple IIe *or* II+ with an 80 column card. RamFactor, no other standard slot card comes close to enhancing AppleWorks so much.

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- Compatible with Apple IIe, II+ and Franklin
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- Built-in self diagnostic software
- Automatic expansion with AppleWorks 1.3 or later
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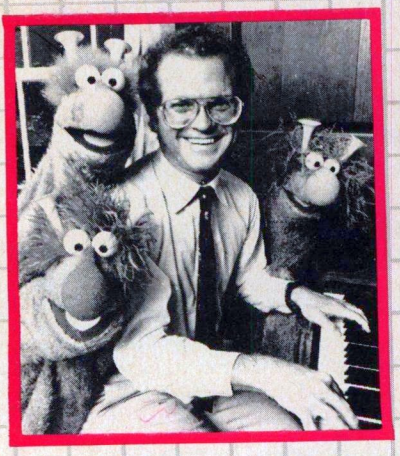

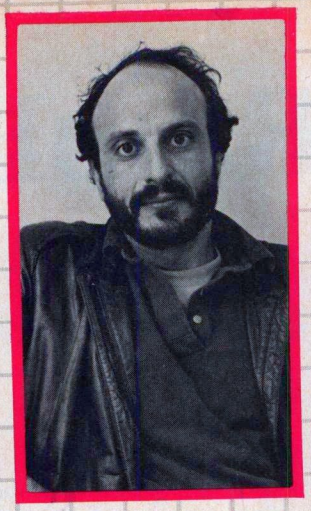

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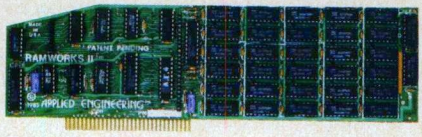

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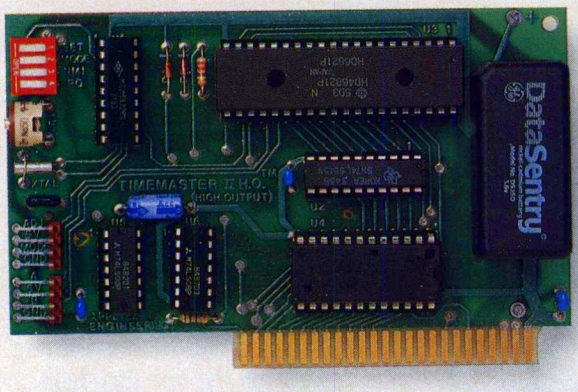

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It's the smart way to put the time and date on your Apple II+® or IIe®. Because only the Timemaster H.O. packs *ALL* the features of all the competition *combined,* including leap year, year (not just in PRO-DOS), month, date, day of week, hours, minutes, seconds and milliseconds. It's totally PRO-DOS, DOS 3.3, PASCAL and CP/M compatible. And of course, it works better than any other clock with AppleWorks.

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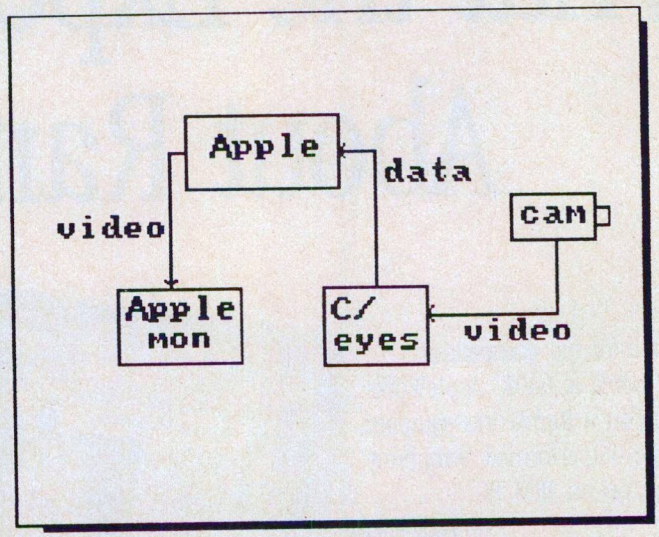
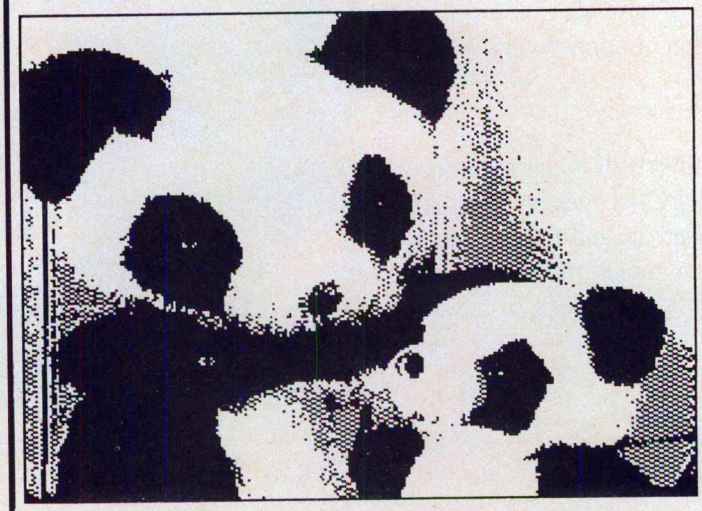
FIGURE 1: The basic COMPUTEREYES setup.



Use

At the beginning of a digitizing session, the menu option ADJUST SYNC permits the synchronization of the system to the input video signal by means of the SYNC knob on the black box. A text display shows when the adjustment is correct. Once set, it won't need to be changed while the same video source is being used. With this minor task accomplished and the camera pointed at something interesting, a picture can be digitized in one of three modes: NORMAL, 4-LEVEL, and 8-LEVEL. NORMAL is the simplest; in about five seconds it produces an image with only two levels of brightness—black and white (Figure 2). The cut-off point or threshold between the levels is controlled by the black box's BRIGHTNESS knob. The other acquisition options take multiple scans of the image at different thresholds and combine them, by a process known as "dithering," to create the appearance of dif-

FIGURE 2: Programmers Aids Nos. 1 and 2 pose for a 2-level portrait.



ferent levels of gray (Figure 3). Remember that Apple pixels can only be on or off—their intensity cannot be varied.

A picture acquired by COMPUTEREYES is a standard Apple hi-res image and can be treated like any other such image. From the menu, it can be saved to a disk either as raw binary data (the equivalent to typing BSAVE MYPIC, A$4000, L$2000) or in a packed (compressed) form which can later be loaded and unpacked by the system software. A raw image takes up about 33 disk sectors; only 13 will fit on a disk. Packing offers considerable saving of disk space, the exact amount dependent on the complexity of the image.

FIGURE 3: An image with 4 pseudo-gray levels. (Courtesy of Digital Vision, Inc.)

Impressions

The setup and use of COMPUTEREYES is all very straightforward and easy. Most users will read the well-written little manual but once. Anyone should be producing pictures within fifteen minutes of receiving the system.

I do offer a few caveats, however. First, this is strictly a monochrome system. Any color information from the video source is ignored. Due to the nature of Apple graphics, where colors are created by lighting adjacent pixels, spurious colors will appear on a color monitor where they may make the picture confusing. A monochrome monitor is ideal for use with COMPUTEREYES.

Secondly, lighting, camera aperture, and system brightness must be set carefully by trial and error to obtain a decent multi-level image. Four levels are difficult. Eight levels, in my opinion, push the Apple past its graphic limitations. (A double hi-res option is available for 128K *//e*'s. It gives very nice results.)

Thirdly, COMPUTEREYES grabs an image that is quite a bit smaller than that which the camera sees. Again, trial and error are called for to determine the cutoff points.

Finally, the simple camera purchased from Digital Vision has a major inconvenience—no viewfinder. The only way to find out what the camera is seeing is to actually digitize an image and examine it in the computer monitor. A camera with an electronic viewfinder will eliminate this problem. A convenient, though more elaborate and expensive, setup uses a VCR as a signal splitter, sending video to COMPUTEREYES and RF (radio frequency) to a second monitor used to adjust the camera prior to digitizing (Figure 4). This arrangement also makes it easy to grab images from videotape.

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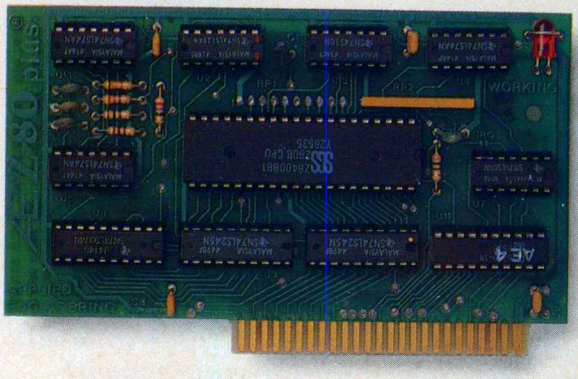

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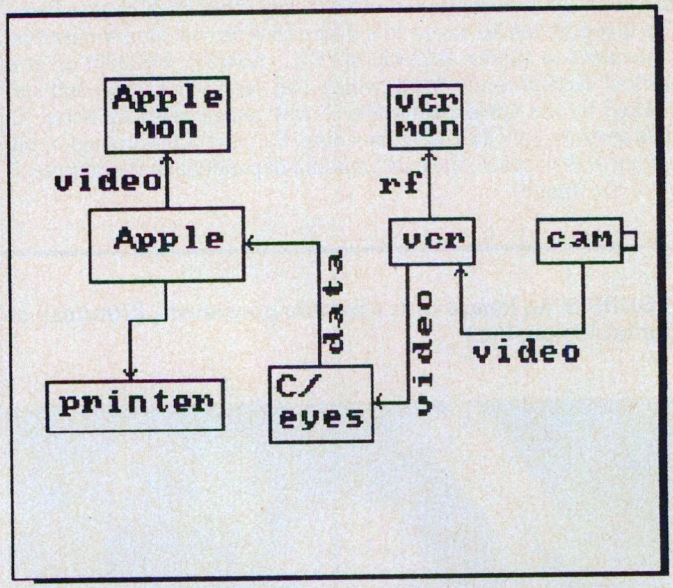
FIGURE 4: The COMPUTEREYES setup used by the author.



Applications

So what's it good for? Well, to start off, it's just plain fun to be able to digitize your friends and loved ones. When pictures are output on a graphics printer (I use our venerable Epson MX-80) they can easily be reproduced by inexpensive methods such as photocopying, whereas a regular continuous-tone photograph must first be converted to a costly halftone. With color copying services widely available, it seems there are great possibilities for producing personalized, illustrated greeting cards, stationery, and other printed materials.

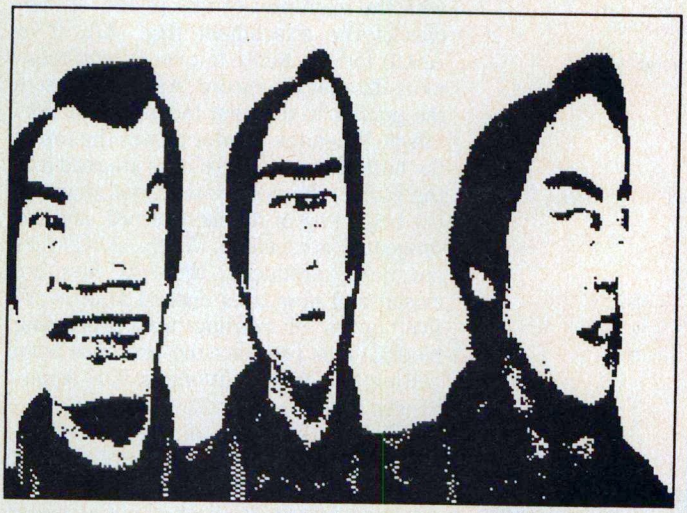
But why stop with straightforward images? There are many ways be "be creative' with COMPUTEREYES. Perhaps the easiest is to digitize a moving image. Since a two-level scan takes five seconds, a subject which moves can appear in several places at different points of the scan. If movement is subtle, a surrealistic stretching occurs. Television programs give whimsical, but unpredictable results (Figure 5); live models can soon learn to syn-

FIGURE 5: A serendipitous caricature grabbed from a TV talk show.

chronize their movements to the scan and control the distortion (Figure 6)

I've chosen to incorporate COMPUTEREYES into my custom, FORTH-based image processing system. Adaptation was easy thanks to the manual's section "Operating COMPUTEREYES From User Programs" and to the assembler source code, available from Digital Vision at extra cost. My hybrid system has proven to be a useful tool for the development of unique images which I use in my graphic design work. Applications have included advertising, posters, book covers, and typography (Figure 7). My wife, Jo, recently used the system to design a large mural for the Washington State Arts Commission. Though COMPUTEREYES is a lot of fun, it's definitely more than a toy!

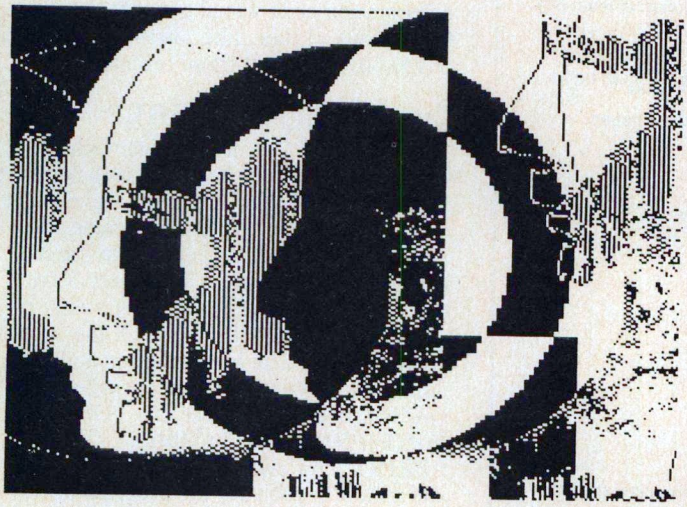
FIGURE 6: Intentional distortion created by movement of the subject.



Summary

I have to rank COMPUTEREYES as one of the all-time bargains among graphics devices for the Apple. Almost daily use over the past year and a half has turned up no major flaws. It's sensibly priced, easy to use without any programming, and performs as advertised.

FIGURE 7: Illustration based on a digitized profile, manipulated by the author's image-processing software.



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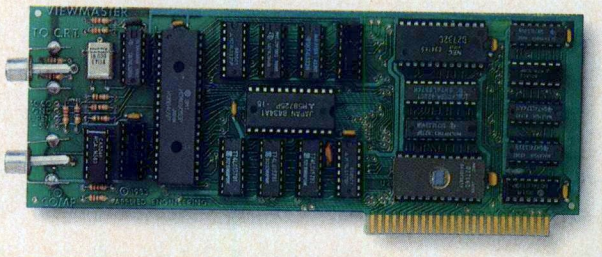

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SUPRTERM		✓					✓	✓	
WIZARD 80					✓		✓	✓	
VISION 80	✓	✓			✓				
OMNIVISION		✓					✓	✓	
VIEWMAX 80	✓	✓			✓			✓	
SMARTERM	✓	✓				✓	✓		
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pfs:file Converter — Continued from pg. 33

```
50140  IF ((SP + 1) * 128) - (P1 + OFF) < 4 THEN PL =  PEEK (BU + (SP
       + 1) * 128 - 2) + 256 *  PEEK (BU + (SP + 1) * 128 - 1): GOSUB
       4010:OFF =  PEEK (BU + P1) + 256 *  PEEK (BU + P1 + 1):P1 = P1
       + YZ: GOTO 50040
50150  IF ((SP + 1) * 128) - (P1 + OFF) = 4 AND  PEEK (BU + P1 + OF)
       <  > 0 THEN PL =  PEEK (BU + (SP + 1) * 128 - 2) + 256 *  PEEK
       (BU + (SP + 1) * 128 - 1):OFF =  PEEK (BU + P1 + OFF) + 256 *
       PEEK (BU + P1 + OFF + 1) - 2: GOSUB 4010:P1 = P1 + YZ: FOR YZ =
       2 TO OFF - 1: GOTO 50060
50160 P1 = P1 + OFF: IF  PEEK (BU + P1) = 0 AND (AA = 0 OR DB) THEN
       50190
50170  IF  PEEK (BU + P1) = 0 THEN  PRINT : PRINT : PRINT "ATTACHMENT
       : ";:PL = AA: GOSUB 4010:P1 = P1 + YZ + 6:OFF =  PEEK (BU + P1)
       + 256 *  PEEK (BU + P1 + 1):AA =  PEEK (BU + P1 - 6): IF OFF <
       > 0 THEN 50040
50180  GOTO 50030
50190  IF  NOT DB THEN  PRINT : PRINT : REM   END OF A RECORD
50200 SP = PN:P1 = 128 * SP + 12: REM  SET UP NEXT RECORD
50210 Y1 = Y1 + 1: IF Y1 = 10 THEN Y1 = 0:Y2 = Y2 + 1: IF Y2 = 10
       THEN Y2 = 0:Y3 = Y3 + 1
50220 NU = 100 * Y3 + 10 * Y2 + Y1: IF NU > NO1 THEN 60010
50230  POKE 1061,Y1 + 176: POKE 1060,Y2 + 176: POKE 1059,Y3 + 176
50240  IF PN =  - 64 - 112 * (CY > 0) THEN 60010: REM    NO MORE
       RECORDS
50250  IF BU + P1 + OFF > 512 * (4 + BH - BL + 1) THEN  GOSUB 55010
50260  GOTO 50010
55000  REM
                    READ NEXT SET OF BLOCKS

55010  PRINT  CHR$ (4)"FLUSH"
55020  IF DIN = DOUT THEN  HOME :MS$ = RD$: GOSUB 7010
55030 CYCLE = CYCLE + 1:BF = 8:BL = BH:BH = BL + 28: IF BH > HB THEN
       BH = HB
55040  IF DB OR ( NOT DB AND  INT ((CY + 1) / 5) <  > (CY + 1) / 5)
       THEN 55080
55050  PRINT  CHR$ (4)"FLUSH": PRINT  CHR$ (4)"CLOSE"
55060 NN$ =  LEFT$ (NM$,9) + ".ASC." +  STR$ ( INT (CY + 1) / 5):
       PRINT : PRINT  CHR$ (4)"OPEN "NN$
55070  PRINT  CHR$ (4)"WRITE "NN$
55080  FOR B1 = BL TO BH: GOSUB 5030:BF = BF + 2: NEXT : GOSUB
       6010:SP = PN - 112: GOTO 50000
60000  REM           FINISH UP ROUTINE

60010  PRINT  CHR$ (4)"FLUSH"
60020  PRINT  CHR$ (4)"CLOSE"
60030  PRINT  CHR$ (7) CHR$ (7) CHR$ (7)"DONE"
```


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to check that the disk is a *pfs:file* data disk, the name of the file, and the number of records on the disk. Then the first 28 blocks of record data are read and the names and number of categories (fields) are found. After that, PROVERT stores the page link address to the next record, sets a flag telling if there are any attachments, sets a pointer to the beginning of the first field's first offset, and moves the pointer along from offset to offset as the data is processed. At the end of each page of data, it gets the address for the next page of data and moves the pointer there. It sometimes has to read the new page into the special overflow buffer. When it finds an offset of zero, it knows that it is finished with the main part of that record. It then checks the attachment flag, AA, if in ASCII format, to see if it needs to process more data for the record. After this, it sets the pointer to the next record's first field offset. When the pointer passes the top of the buffer, the next 28 blocks are read into the buffer, the pointer is moved down to the beginning of the next record, and the procedure is repeated. When "ASC" files are being produced, the text files are closed and new ones opened after every five cycles of reading and processing blocks. This prevents the text files from getting too large to fit onto a 55K AppleWorks Desktop.

The hardest part of creating PROVERT.2 was taking care of the offsets and space compression codes when they occurred too close to the end of the pages. For example, if the space code occupied the last three bytes on a page, then PROVERT.2 found the "01" code telling it that the next byte was the number of spaces to embed in the text, and then it read the page number, where the text continued instead. Offsets landing within the last four bytes on a page did the same thing. Sometimes the page link to the next page would get mistaken for the offset or compression code, and sometimes the offset or compression code would be mistaken for the page link. Sometimes the offset or compression code would get split up over two pages. Lines like 3010-3040 and 50130-50150 correct these problems.

Customizing PROVERT.2

PROVERT.2 works great with the way that I use *pfs:file*, but may work better for some other people with some minor changes. If your "ASC" files come into AppleWorks being either too small or too large, then change the "5" in lines 55040 and 55060 to a larger or smaller value. If you are creating "DB" files to use with AppleWorks's data base program and use more than one page for your records, then you will need to remove the "OR DB" from line 50160 and the "PRINT : PRINT : PRINT "ATTACHMENT : ";:" from line 50170. If you save the program under another name, be sure to change the name in line 1000.

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Designed by Joy George

The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards in one slot. One of these cards is selected for use, and *only* that card draws power.

This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers. **$179.50**

SWITCH-A-SLOT and **EXTEND-A-SLOT** work well with most slow to medium speed cards, such as modems, printers, clock, music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards.
Due to the nature of these products, and unit-to-unit variations of computers and peripherals, we are unable to guarantee that these products will work with any particular system. However, as with all our products, we offer a ten-day trial period. If our product does not operate to your satisfaction, return it for a prompt refund.

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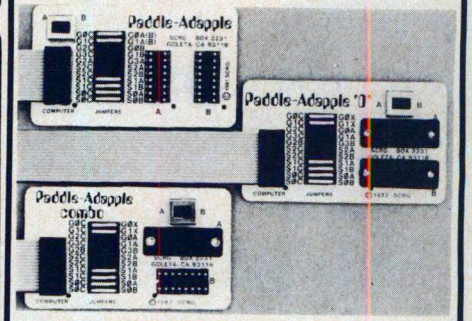
The are three versions to adapt to any combination of the newer type APPLE connector (the 9-pin D sub-miniature), or the older 16-pin plug.



- The **PADDLE-ADAPPLE** has two 16-pin sockets.
- The **PADDLE-ADAPPLE 'D'** has two subminiature 'D' (9-pin) connectors.
- The **PADDLE-ADAPPLE COMBO** has one 'D' subminiature and one 16-pin connector.

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for APPLE //e & //c

The 9-16 adapter permits the use of most 16-pin I/O devices with the APPLE //e or //c. Plugging this adapter into the subminiature 'D' connector allows the use of 16-pin device, such as the **PADDLE-ADAPPLE**, paddles, joystick, 16 pin Koala Pad™, etc. The only limitations are those devices that use the annunciators or the $CØ4Ø strobe. **NOTE**–the //c does not support the simultaneous use of two joysticks. **$14.95**

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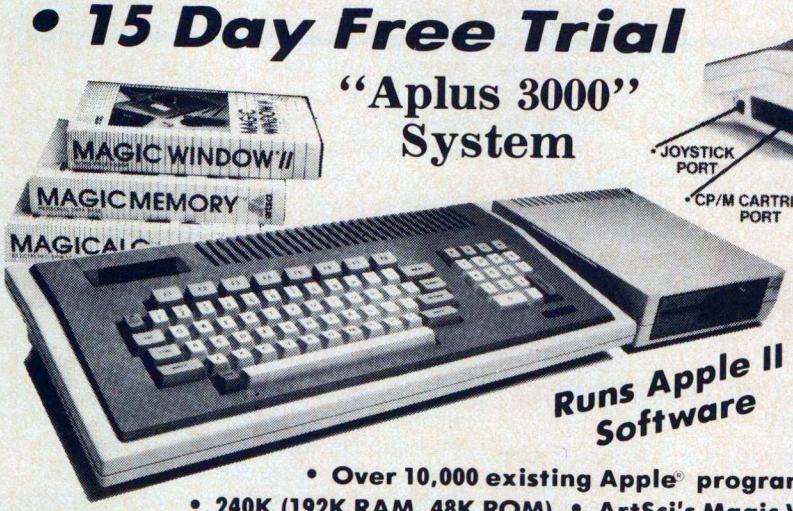

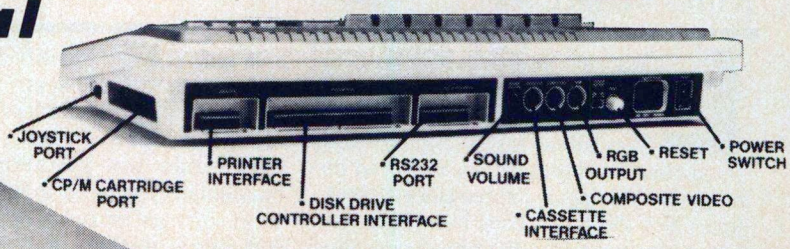

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  - — 5 X 7 characters in 7 X 8 matrix.
  - — Upper and lower case characters.
  - — One of Eight colors for characters/graphics and background, Red, Green, Blue, Cyan, Magenta, Yellow, Black and White.
  - — Character set with normal, inverse and flashing capabilities.
- **GRAPHICS**
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  - — 280H X 192V 8 colors bit image — Black, White, Red, Green, Blue, Cyan, Magenta, Yellow.
  - — 560H X 192V 6 colors — Black, White, Violet, Green, Blue, Orange. (High resolution color monitor required)

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Features	Aplus 3000	Apple IIe	Commodore C-128
RAM	192K	64K	128K
Runs Apple II Software	Yes	Yes	No
Function Keys	24	None	16
4 Voice, 6 Octave Sound	Yes	No	Yes
Composite Video	Yes	Yes	Yes
Disk Drive	included	Extra Cost	Extra Cost
Numeric Keypad	included	Extra Cost	Included
Video Cable	included	Extra Cost	Extra Cost
RGB Color Card	included	Extra Cost	Included
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Issues in Using Spreadsheets — Not for Beginners Only: Part 2

Jeffrey M. Jacques

LAST month we noted several important factors associated with using spreadsheet software and the advantages of building templates. Furthermore, we explored the steps in defining a "spreadsheet" problem. Once the basics have been done, you are ready to consider the fifteen questions outlined last month. The substance of the first six questions is the topic of this article while the remaining questions will be considered in the next part. More specifically, in this article we shall cover these questions:

QUESTION # 1: Do I understand the problem?
QUESTION # 2: Template or worksheet?
QUESTION # 3: How can I best structure the template?
QUESTION # 4: How can I best communicate my results?
QUESTION # 5: What data are needed?
QUESTION # 6: What is/are the essential formulae?

QUESTION #1: Do I Understand The Problem?

Computer programs—including electronic spreadsheets—are only as good as the people who design and use them. The most important factor in successful use of spreadsheet programs is you, the user. If you understand what you want to do, and the power and limitations of electronic spreadsheets, then you will find the creation of useful spreadsheets an excellent tool. If you only have a vague idea of what your problem is or what you want to do, or you don't understand what spreadsheet software can and cannot do, then working with spreadsheets can be a frustrating experience.

For example, trying to determine if I could afford a software package is reasonable only if I can identify all my income and expenses. Leaving any expense or income category out can lead to the wrong conclusion. Similarly, being unable to conceptualize my problem in simple mathematic terms can make THE Spreadsheet software unusable. It is only by clear and logical thinking, and having a good understanding of how to conceptualize the problem, that THE Spreadsheet can help solve it.

QUESTION #2: Template or Worksheet?

In our introduction we noted that worksheets are spreadsheet applications which are created for immediate and limited use. When you have to make a quick decision, would like to see the likely consequences of a decision, and you do not plan to share the results with others, then a worksheet is a reasonable way to go.

I find, however, that creating a worksheet for a quick decision is likely to produce a quick error or errors—errors which are often undetectable until it's too late. I suggest, therefore, that if you are going to use spreadsheets, then consider seriously creating templates which can be used more than once and shared with others.

I find that even small problems are often recurring ones—problems which require regular re-examination. For example, with a saved income/expense template, you could easily load it, then recompute the differences between income and expenses every time there was a change for any expense category, rather than having to rebuild the worksheet each time.

The point is this: it pays to spend a little extra time developing a template because it can be used by you again and again. And, with a little modification, it can be used to answer similar and related questions under a variety of circumstances. You can save a considerable amount of time down the road by taking a few extra minutes now.

One of the nice advantages of building templates with THE Spreadsheet is that they can be shared easily with others. Because you have the ability to enter labels, vary column widths, and enter formulae as well as values, THE Spreadsheet enables good communication between yourself and others. What is required is a well thought out template in terms of organization, data entry and result display. More on this later.

One final question is, Who else will be using your model? If you are working in a real estate office, then you may be building a model for your own use as well as for all the real estate agents in your office. Such models require a knowledge of the skill level of other users. The poorer the skill level of other users, the greater the need for clarity in how and where the user shall enter data and find the results. Templates, rather than worksheets, become the necessity in such situations.

QUESTION #3: How Can I Best Structure The Template?

Organizing and structuring a good template is akin to developing and telling a good story. All good stories begin with a beginning, have a middle where the story line and characters are developed, and describe the outcome(s). A good template has a beginning—a clearly labeled specified area for data entry, a middle where all the essential formulae and mathematics are performed, and a place to describe the outcome—display the results in a meaningful tabular or graphic manner.

Each of these major sections may be separated by one or more blank columns or rows. Indeed, with second and third generation software, you can even use summary labels to identify substantial parts of the template. Feel free to use repeating lines and characters to indicate beginning, middle and outcomes of your template. After all, with the additional memory RAM board(s), you are quite unlikely to run out of room.

Additionally, any good story—one in which the author has some pride—should contain a title, the author's name, and the date of publication. Well, there is no reason why the templates you construct

should not contain the same information. In the beginning of each template the title, author and date should be listed. The title and author will remain quite stable. The date will be used to indicate the date of last modification or update. This will be a good way to keep track of multiple templates which address similar questions.

QUESTION #4: How Can I Best Communicate My Results?

Thinking about how to display your results sounds like an easy thing to do. All you need to figure out is what you want to say. Right? Well, not quite.

Clearly, it is essential that you know what you want to say. But, knowing how to organize and say what you mean is essential if you are to be successful in communicating your results with others. Knowing the limitations of your computer is also important. For example, do you wish to communicate your results using the screen display or by sharing hard copy outputs?

If you plan to use a screen display, then the organization of what you wish to display is limited at any one time by a maximum of twenty rows of information. And, if you are using the 40-column display, you will probably have no more than a half dozen columns of information. With an 80-column card you will be able to double the amount of information displayed on the screen. This may sound like a lot, but when you start to work with sophisticated templates, you will quickly realize how severely limiting the screen display can be.

Because the number of cells is quite limited, people often try to cram too much information into too little space. If you must display results on the monitor, then you might wish to consider dividing the tabular outputs into sections. This will give you additional room to insert blank rows and columns which can enhance the readability of your display.

Using hard copy printouts of important information and results is a reasonable alternative to trying to display information on the screen. The basic question is still: How can I best communicate my findings? or, What do I wish the printout to look like? Clear, concise, well labeled and documented printouts can go a long way in effectively communicating your results.

Since THE Spreadsheet comes with a printout FORMAT subsystem, you will find it quite easy to structure your outputs in a reasonable fashion. Think about what you wish to say and remember, although you have a complete page to effectively communicate your results, you don't have unlimited space. Most printers use standard output pin feed paper which limits your output to about 66 rows and 80 columns of information. Even with wide carriage (132 column paper) or condensed printing, giving considerable forethought to how you wish the output to look is essential. It can save you considerable work and greatly improve the likelihood for effective communication of your results.

QUESTION #5: What Data Are Needed?

Now that you know what you want to say and how you wish to say it, it is essential that you identify *all* the essential data you will need in order to compute your findings. Make a list of the essential variables or factors of your problem. Determine what you need in order to determine precisely, reliably and validly what you wish to know. Think about the article from last month. What budget or tax categories did we forget? Now, take a few moments and think about a budget for your family. What are the important categories? Go ahead and jot down your answers.

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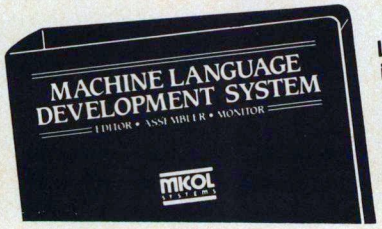

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QUESTION #6: What Is/Are The Essential Formulae?

Basically, we are interested in the intermediate steps between data entry and displaying the results. What values, formulae and functions do I need? Three of the really nice features of THE Spreadsheet are: (1) the ability to use common algebraic expressions—albeit, in a slightly modified first in/ first out form—without having to learn a programming language, (2) the substantial array of THE Spreadsheet functions for automatically SUMming, COUNTing, LOOKing UP values, etc., and (3) the ability to /REPLICATE a series of cells which have formulae, thereby transferring the formula from those cells in such a way that new values can be computed with minimum effort.

At this point you should be able to identify the formulae you will need for your template. Perhaps you already know the formulae you need. (That's great.) Or, perhaps the formulae may be found in standard reference works. (A reasonable possibility.)

For the new user, one word of caution on entering formulae with THE Spreadsheet. All formulae are "order dependent." The Spreadsheet evaluates formulae and cells in the order in which they are encountered in an expression while SuperCalc3 uses standard algebra. This difference can produce unanticipated results. If you are not sure of what cell is processed first, then use as many parentheses as you feel might be needed. The liberal use of such parentheses will improve the probability that you will get the correct result.

Before you start to work on your template, spend some time examining alternate formulae. Most mathematical procedures in the worlds of business and science have several formulae which are algebraically equivalent. (Many conceptually meaningful formulae were modified so that they could be solved more easily when all you had were pad and pencil or a calculator.) I suggest that you choose the most conceptually meaningful formulae. The Spreadsheet has thousands of cells and operates quickly. Using calculator formulae that have no conceptual meaning may make debugging more difficult. Using conceptually meaningful formulae, however, will allow you to more quickly find your errors and understand sections of the displayed values. Finally, actual time differences between calculator formula and conceptual formula is insignificant when using any spreadsheet software. So, you are better off to use conceptually meaningful formulae to analyze you data.

Formulae have different levels of complexity. Simple formula can usually fit into one cell of THE Spreadsheet worksheet. If the formula is complex, however, explore if it can be partitioned into various logical sections. Make sure that each cell can be referenced appropriately until the entire equation is solved. Make sure that the partitioning of the formulae is absolutely clear. Of course, you can use labels for each step. Very often you will be able to use a spreadsheet function in place of several algebraic statements. For example, the @SUM function can easily substitute for a series of addition statements. In order to use such functions effectively, spend a few minutes examining your formulae, then determine where and what functions can be used. This step can save a considerable amount of effort —some would say wasted effort—on your part.

Finally, one of the best commands that you will learn to master will be the **/REPRODUCE** command. When you have a series of values, labels or formulae, the /REPRODUCE command can save hours. When working with a series of formulae, for example, such that the same procedure or some of the same cells are referenced in the formula, the /REPRODUCE command will efficiently enter the essential equations for you. All you would need to do is to enter it correctly the first time, give the /REPRODUCE command, and indicate how it is to handle the referenced cells. This can save hours and insures accuracy—two premiums in my book.

A Worked Example

All this may sound simple, but it can be extremely frustrating when you think that you have completed your work only to find that you have: (1) not completely understood the problem, (2) created a cluttered worksheet, and (3) forgotten an important factor or formula. Let's take what appears "simple" and see just how "not so simple" it is. We'll use a family budget.

Okay, the simple side. Clearly any family budget should include income and expense items. Income is generally easy to figure when there is one and only one

TABLE 1

FAMILY BUDGET ANALYSIS WORKSHEET

	A	B	C	D	E	F	G	H	I	J	K	L
1	Jacques											
2	1/1/86											
3				FAMILY BUDGET ANALYSIS FOR: @onth? year?								
4	==========											
5				Total							Actual	Dif-
6				YEARLY	JAN	FEB	MAR	APR	MAY	JUNE	Dollars	fer-
7				Budget								ence
8	----------											
9	INCOME											
10	----------											
11	Breadwinner #1											
12		Wages- Salary		25000	2083	2083	2083	2083	2083	2083		2083
13		Consulting		4000	333	333	333	333	333	333		333
14		Profits		0	0	0	0	0	0	0		0
15		Interest & Dividends		1245	104	104	104	104	104	104		104
16		Automatic Deductions		1500	125	125	125	125	125	125		125
17		Other			0	0	0	0	0	0		0
18		Subtotal		31745	2645	2645	2645	2645	2645	2645		2645
19	Breadwinner #2											
20		Wages- Salary		9000	750	750	750	750	750	750		750
21		Consulting		0	0	0	0	0	0	0		0
22		Profits		0	0	0	0	0	0	0		0
23		Interest & Dividends		375	31	31	31	31	31	31		31
24		Automatic Deductions		240	20	20	20	20	20	20		20
25		Other		0	0	0	0	0	0	0		0
26		Subtotal		9615	801	801	801	801	801	801		801
27												
28	Total Income			41360	3446	3446	3446	3446	3446	3446		3446
29												
30	EXPENSES (FIXED)											
31	----------											
32		Mortgages,Rent		7200	600	600	600	600	600	600		600
33		Insurances:			0	0	0	0	0	0		0
34			Medical	550	46	46	46	46	46	46		46
35			Auto	230	19	19	19	19	19	19		19
36			Life	250	21	21	21	21	21	21		21
37		Loans:			0	0	0	0	0	0		0
38			Auto	1200	100	100	100	100	100	100		100
39			Appliances	0	0	0	0	0	0	0		0
40			Furniture	0	0	0	0	0	0	0		0

41	Home Improvem't	1200	100	100	100	100	100	100	100
42	Tax Liabilities		0	0	0	0	0	0	0
43	Federal	3500	292	292	292	292	292	292	292
44	State&Local	1275	106	106	106	106	106	106	106
45	Other		0	0	0	0	0	0	0
46	Subtotal	15405	1284	1284	1284	1284	1284	1284	1284
47									
48	EXPENSES (VARIABLE)								
49	----------								
50	Auto:		0	0	0	0	0	0	0
51	Gas	720	60	60	60	60	60	60	60
52	Upkeep	600	50	50	50	50	50	50	50
53	Books & Journals	120	10	10	10	10	10	10	10
54	Children's Allowance	240	20	20	20	20	20	20	20
55	Clothing:		0	0	0	0	0	0	0
56	Self	300	25	25	25	25	25	25	25
57	Spouse	500	42	42	42	42	42	42	42
58	Childrn	150	13	13	13	13	13	13	13
59	Computer	0	0	0	0	0	0	0	0
60	Education	50	4	4	4	4	4	4	4
61	Food:	4800	400	400	400	400	400	400	400
62	Bread & Cereal	0	0	0	0	0	0	0	0
63	Milk	0	0	0	0	0	0	0	0
64	Meat	0	0	0	0	0	0	0	0
65	Produce	0	0	0	0	0	0	0	0
66	Pastries	0	0	0	0	0	0	0	0
67	Liquor	250	21	21	21	21	21	21	21
68	Pet Food	100	8	8	8	8	8	8	8
69	Gifts & Donations	500	42	42	42	42	42	42	42
70	Home Repair	200	17	17	17	17	17	17	17
71	Medical Care		0	0	0	0	0	0	0
72	Medicine	100	8	8	8	8	8	8	8
73	Doctors	120	10	10	10	10	10	10	10
74	Pocket Money	600	50	50	50	50	50	50	50
75	Professional Dues	180	15	15	15	15	15	15	15

wage earner who earns all his/her income from a single source. But what about the income earned by other family members? What about other sources of income?

Similarly, the expense side of the budget appears straightforward. All right, without looking at Table 1, try to list the categories of your expenses and then try to develop your template using your favorite spreadsheet software.

Now, look at Table 1. While you probably have listed many of those I noted, how many did you miss? Indeed, how many did I miss?

This family budget template was designed to cover the great majority of typical sources of income and expense experienced by all of us. It has four major sections. The first section, rows 9 through 29, begins with a list of all the sources of income that you and your spouse are likely to have. Immediately below these income sources are a list of expenses. Expenses have been divided between "fixed expenses" —e.g., mortgage, insurance, loan repayments and tax liabilities, and "variable expenses"—e.g., automotive, clothing, education, food, and even computer expenses. I even included a row for children's allowances. In some cases I have further subdivided the list—e.g., food into food subgroups and other consumables such as pastries, liquor, etc. This will help maintain consistency between the template created last month (i.e.,

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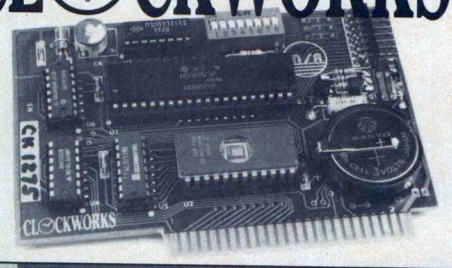

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SIMPLE ONE COMMAND TIME SETTING	YES	NO!	YES
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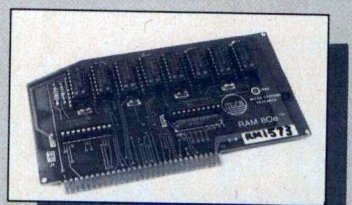

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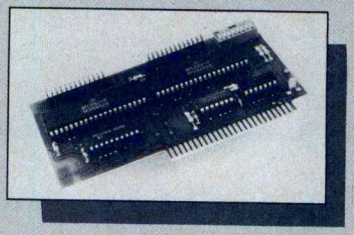

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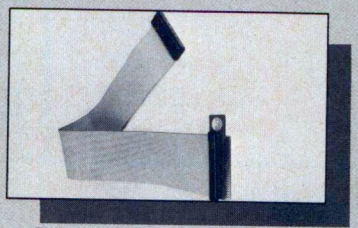

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76	Recreation	240	20	20	20	20	20	20	20
77	Telephone:		0	0	0	0	0	0	0
78	Local	240	20	20	20	20	20	20	20
79	Long Distance	120	10	10	10	10	10	10	10
80	Utilities:	2640	220	220	220	220	220	220	220
81	Electric	0	0	0	0	0	0	0	0
82	Garbage	0	0	0	0	0	0	0	0
83	Gas	0	0	0	0	0	0	0	0
84	Sewer	0	0	0	0	0	0	0	0
85	Water	0	0	0	0	0	0	0	0
86	Other	0	0	0	0	0	0	0	0
87	Subtotal	12770	1065	1065	1065	1065	1065	1065	1065
88									
89	TOTAL EXPENSES	28175	2349	2349	2349	2349	2349	2349	2349
90									
91	INCOME-EXPENSES	13185	1097	1097	1097	1097	1097	1097	1097
92									
93	SAVINGS								
94	----------								
95	Appliances	0	0	0	0	0	0	0	0
96	Auto		0	0	0	0	0	0	0
97	Education	4000	333	333	333	333	333	333	333
98	Furniture		0	0	0	0	0	0	0
99	House		0	0	0	0	0	0	0
100	Investment	4000	333	333	333	333	333	333	333
101	Vacation	2000	167	167	167	167	167	167	167
102	Other								
103	Subtotal	10000	833	833	833	833	833	833	833
104									0
105	SLUSH FUND	3185	264	264	264	264	264	264	264
106									
107	==========	==========	==========	==========	==========	==========	==========	==========	==========
108									
109									

checkbook template) and the categories used this month.

Further, I included a section on savings. Rather than labeling it by bank account, I find it most useful to work with a label which indicates goals. Finally, to deal with any discrepancies between income, expenses, and savings, I have included a slush fund category. All in all, this is a typical list of where families get their money and how they save and spend it.

The second part of the family budget template is the section reserved for you to enter yearly expected income, expenses, and saving goal amounts. Remember, here we are working with yearly estimated totals. Now, take a few moments and think about reasonable amounts for each of the categories listed in Table 1. Column D is reserved for entering these dollar amounts. So, next to each income, expense or saving category, take a few moments and enter your data.

The third part of this template is reserved for the estimated monthly analysis of your income, expenses, and savings. The analysis is provided over a six month period. (Six months is about the largest time period with which I find estimates to be accurate.) The yearly amounts entered in column D are divided by 12—the number of months in the year, and then rounded off to a whole number for each listed month. As you would expect, the formula in cell E12 is simply:

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This formula is simply /Replicated throughout column E with the following steps:

ENTER	DISPLAY ON PROMPT OR ENTRY LINE	MEANING
/	/: ABCDEFGILMPRSTW-	ENTER COMMAND
R	REPRO: (, SOURCE RANGE OR RETURN E12 is displayed on entry line	REPRODUCE EXPRESSION
(	LIMIT: AFCVNR)	SELECT OPTION
R	R is displayed on entry line	RELATIVE IN CELL REFERENCES
)	REPRO: (, SOURCE RANGE OR RETURN E12 is displayed on entry line again	END REPRODUCE OPTIONS
:	REPRO: ENTER TARGET RANGE OR RETURN E12:	END SOURCE RANGE
E13	E12:E13	FIRST DESTINATION CELL
	E12:E13. . .	ELLIPSE OR THROUGH CELL
E17	E12:E13...E17	LAST DESTINATION CELL

Now, cells E12 through E17 have the corrected formulae. Note that THE Spreadsheet did not ask you RELATIVE or NO CHANGE. You already indicated RELATIVE when you selected R in the options parameter. To transfer these formulae to the remaining months, do:

ENTER	DISPLAY ON PROMPT OR ENTRY LINE	MEANING
/	/: ABCDEFGILMPRSTW-	ENTER COMMAND
R	REPRO: (, SOURCE RANGE OR RETURN E12 is displayed on entry line	REPRODUCE EXPRESSION
(	LIMIT: AFCVNR)	SELECT OPTION
N	N is displayed on entry line	NO CHANGE IN CELL REFERENCES
)	REPRO: (, SOURCE RANGE OR RETURN E12 is displayed on entry line again	END REPRODUCE OPTIONS
.E17	E12...E17	ELLIPSE OR THROUGH CELL
:	REPRO: ENTER TARGET RANGE OR RETURN E12...17	END SOURCE RANGE
F12	E12...E17:F12	FIRST DESTINATION CELL
	E12...E17:F12...	ELLIPSE OR THROUGH CELL
J12	E12...E17:F12...J12	LAST DESTINATION CELL

(Note that we used the N, NO CHANGE, option rather than the R, RELATIVE, option in the second step.) Rather than just completing one row or column at a time, this will complete all the cells in a rectangular grid from F12 through J17. This can be a real time saver when you have many blocks of formulae to reproduce.

(One cautionary note is necessary. This little procedure will work correctly only when you consistently wish the NO CHANGE or the RELATIVE option, not both of these options in the same formula.)

Part four of this template will give you an opportunity at the end of the month to see how well you have stayed within your budget. Column K provides you with an opportunity to enter the actual dollars you earned, expended or saved. Just enter the values from your checkbook template into column K.

Column L will compare your budgeted amount to the actual amount and reports the difference between these two amounts. A simple subtraction formula was used: (e.g., cell L12 contains the expression +E12-K12). The expression is then /Replicated throughout column L. Any negative amount will indicate that the actual amount was greater than the budgeted amount while any positive amount will indicate that your budgeted amount was greater than the actual amount.

To speed data entry, you may wish to enter /Global Recalculation Manual. If you choose this option, then once you complete all the actual entries of your monthly amounts, a simple press of the ! command will automatically compute the monthly difference between budgeted and actual amounts. You will have a quick analysis of what went on during the month and how successful or unsuccessful you were in staying within your budgeted goals.

To aid you in your data entries, this template should include the use of the **/TITLES** command. It should be invoked for columns A through C. (Of course, with THE Spreadsheet or SuperCalc, you could easily have listed all the labels in column A. But I thought that I might help those who are still using the original VisiCalc.) This will keep your income, expense and savings categories on the screen at all times and help you to accurately enter all the values as well as examine monthly totals, actual amounts, and the difference, if any, between budgeted and actual amounts.

(If you wish to disable this command, simply enter **/TN**. These three steps indicate: **/**, choose command: **T**; TITLES command is chosen, and **N**, NO TITLES should be used. This will remove the /TITLES command and allow columns A through C to scroll off the screen.

Conclusions

This template is a good example of the need to be sure that: (1) you fully understand the problem, (2) you have all the appropriate categories/data/formulae, and (3) you considered the factors associated with formating the template—data entry, areas of computation, and output/result areas. It illustrates well the need to isolate convenient sections of your template. Freely label all elements and clearly identify explicitly where data are to be entered. (You might wish to use the ENTER # label for all cells which are to be replaced with numeric values while /Protecting all cells with formulae. More about this next time.)

Of course, this template can be modified to better fit your needs. For example, you may wish to keep a monthly comparison between income and expenses. Just insert the necessary columns and /Replicate the appropriate formulae. Alternately, you may wish to just use a six month summary for the comparison. This can be easily accomplished by simply modifying the formula in column E (divide by 2 rather than 12), and /Deleting columns F through J. All formulae in column L will be changed automatically.

The basic point is this, templates are best when they serve your needs and you can create them easily. Next time we shall work directly with the rest of our questions:

QUESTION #7: How redundant do I need to be?
QUESTION #8: What have I forgotten?
QUESTION #9: What's the easiest way to build the template?
QUESTION #10: How best to test this version of the template?
QUESTION #11: What cells need to be protected?
QUESTION #12: Do I need instructions in this template?
QUESTION #13: Final warnings—recalculations?
QUESTION #14: Do I need other documentation?
QUESTION #15: How best to test the final template?

We will have an opportunity to examine another spreadsheet application, too. See ya then. . . .

Author's Note

The template, family budget model, used in this article was based, in part, on the models presented in Castlewitz, David M., Chisausky and Patricia Kronberg. *VisiCalc: Home and Office Companion.* Berkeley, CA: Osborne/McGraw-Hill, 1982.

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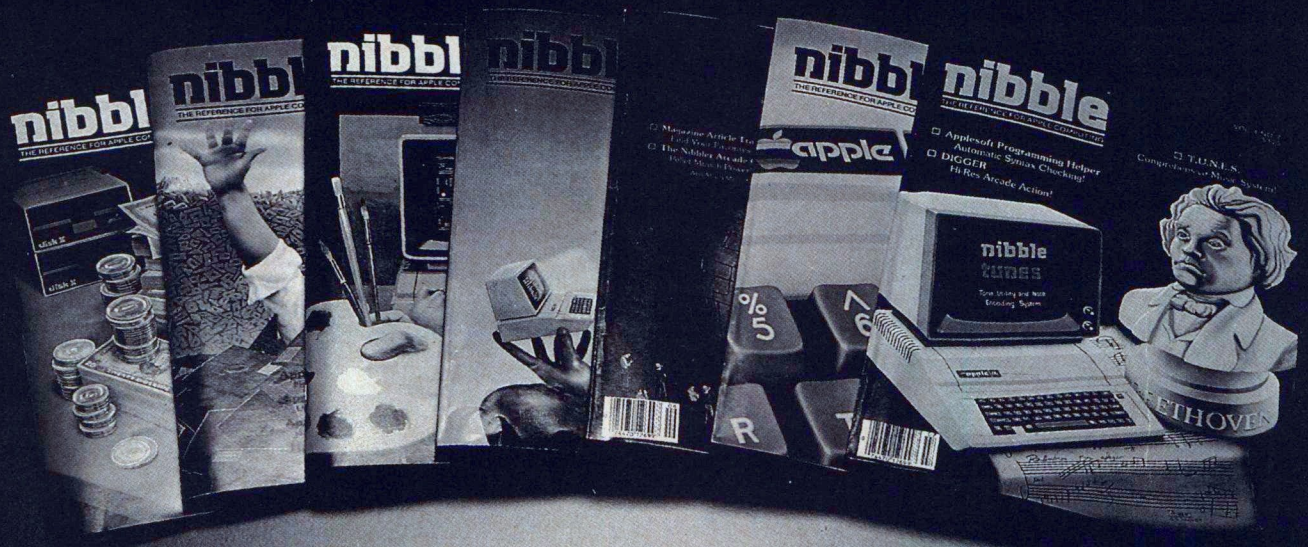

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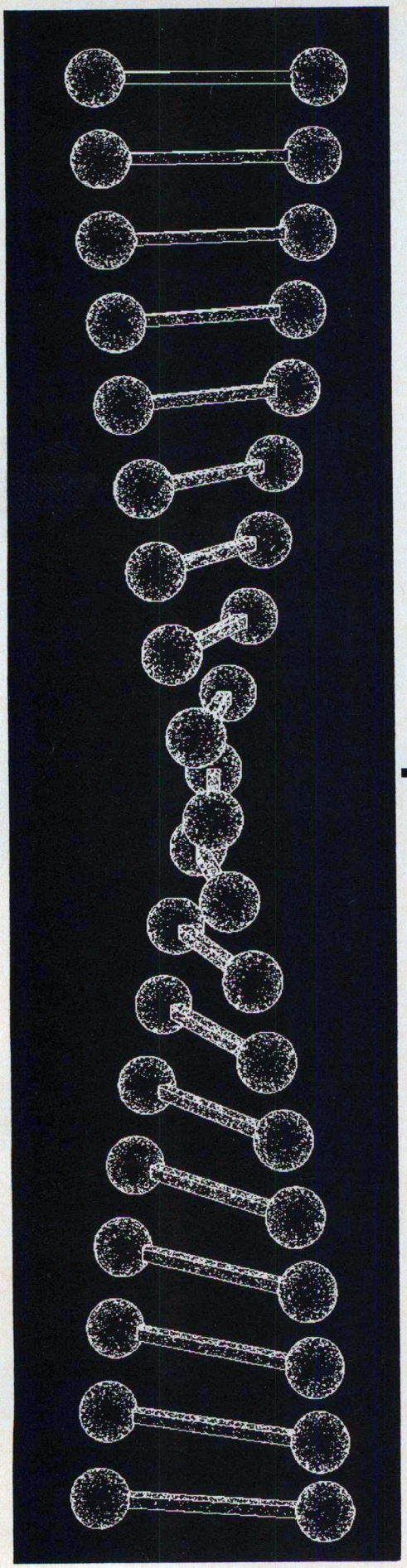

Silicon Intelligence, Carbon Intelligence, Intelligence

Michael & Lisa Storrie-Lombardi

We have looked over a number of the Artificial Intelligence (AI) columns currently underway in other journals and walked away with a couple of central impressions. First, a number of them clearly assume that the reader possesses a considerable degree of expertise in AI concepts. Secondly, so many exciting (and controversial) things keep happening in the AI world that every column seems to have its own unique focus. At least six main types of information transmission occur in these articles:

1. News concerning developments at the forefront of the AI research community.
2. News about commercial products now appearing that the AI purist would rank as "smart" or "helpful" or "useful" but not intelligent.
3. Educational information to bring an ever expanding group of interested, novice (to AI concepts) end users up to snuff on AI strengths and limitations.
4. Creative ways to modify already available databases, graphics systems, and spreadsheets to look intelligent (and make us look more expert).
5. Tutorials on the utilization of specific commercial expert systems.
6. Programming tips and tutorials focusing on specific languages.

Now, we happen to feel that all of these areas have something to offer and each provides critical information if we plan to understand the actual worth and pitfalls embedded in the "AI revolution" hype. Since we have no way of knowing what you want to know, already know, or have a desire to learn, we shall just wade into areas and await your correspondence.

It makes sense at this point to start as if we all feel like neophytes heading into the wizard's lair. Let's wander pleasantly through some of the historical development of AI, review some late breaking news from the world of AI speculators and investigators, and agree on some basic definitions for crucial concepts in AI.

A Race Through History

In the early 1940's and 50's Warren McCulloch, Walter Pitts, and Norbert Weiner first developed an abstract model for the basic information functions of the human cortex, devised a formal calculus to describe central nervous system neuronal activity, and developed the autoregulation and feedback concepts into a coherent body of knowledge named "cybernetics" (6,12). For the next decade, a considerable amount of AI work centered around attempts to get a computer to simulate the way the human neural net operates.

A couple of things got in the way of producing a smart computer using robot-mimick-man techniques. First, in spite of the excellent work by McCulloch, Pitts, Weiner, and others, we still reek of ignorance about how our neural net works in either a hardware (DNA, neuronal cell bodies, neurotransmitter substances) or software (perceptions, memories, logic) sense. We do not even know exactly where we put a memory for safe keeping, how we make some of them easy to find, or how we conveniently lose them. Second, the human brain contains at least 10 or 12 billion neurons, and perhaps a thousand times that many cross connections. To top it off, it may turn out that some of our information storage process goes on at the DNA (genetic) level in each cell. Would you believe that gets us up into the equivalent of gigabytes of ROM and RAM just to find the orange juice each morning? In fact, some folks good with a slide rule have estimated that we process enough information in a minute through visual input channels alone to keep a Cray busy for several hours. If you would like a good review of some of our current ideas about brain function and organization take time to read Kent's, *The Brains of Men and Machines(4)*.

By the 1960's a number of investigators had turned away from their attempts to model silicon hardware and software on neural hardware and shifted to attempts to build systems that would mimick the human tricks we usually call symbol-manipulation. A number of investigators began to devise small micro-worlds and use heuristic search strategies (see definitions) to handle problems involving fairly precise rule sets. Newell and Simon at Carnegie-Mellon made a significant contribution with a program called the General Problem Solver or GPS (9). It functioned well within the constraints of a micro-world, but had trouble with the more generalized problems of the real world. GPS also relied on a depth-first search strategy (see definitions) with all the thoroughness, but slowness and face value naivety, of that method.

Other pioneer AI researchers in the early 60's shifted the focus a bit and began to ask what the process of programming a computer could tell us about how the human brain solves problems. In 1962 Colby produced a simple model of the verbal output from a neurotic patient(2). The program in original form (written in IPL-V, a list oriented language) let you input a series of beliefs and then the program bubbled up free-associations for hours oblivious to any more input from you (should sound familiar to many a psychoanalyst). Later versions written in ALGOL stored knowledge in four arrays: the Belief Matrix, the Dictionary, the Substitute Matrix, and the Reason Matrix. The program could hold complex beliefs, modify its basic beliefs, "defend" itself against input beliefs, and demonstrate to students how a complex system can withhold information from different parts of its thinking pro-

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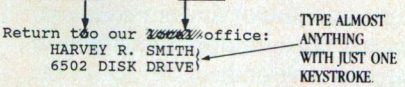

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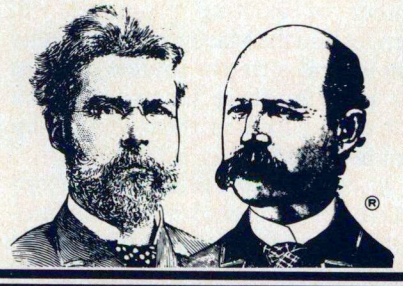

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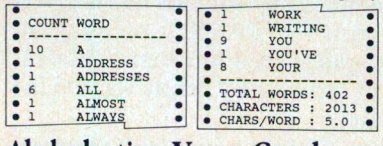

COUNT	WORD
10	A
1	ADDRESS
1	ADDRESSES
6	ALL
1	ALMOST
1	ALWAYS

1	WORK
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AD #MW2

cess. While programs such as this and Weizenbaum's famous ELIZA programs (11) intrigued students and experts alike, program rigidity remained problematic. Marvin Minsky (7) encouraged the AI community to focus on how we might represent knowledge in flexible and useful ways. He had a wonderfully straightforward way of defining a computer's behavior as intelligent if it simply did something that we would think intelligent in human behavior. Since flexibility appears as a cornerstone in successful, survival oriented human behavior, it follows that an AI program needs to at least look flexible at the user interface level and then back that up with powerful symbol understanding and manipulating techniques.

By the late 60's and early 70's interest in representing knowledge systems with flexible data structures had accelerated, culminating in the acknowledgement of John McCarthy's LIST Processing language, LISP (5, 13, 14) as the prinicipal tool of the AI community. We shall tackle some of the advantages inherent in LISP in a later column.

At about the same time, Feigenbaum's team at Stanford took the apparent weakness of GPS, saw that in a way it could become a strength, and developed the concept of focusing programming efforts on very particular areas of expertise. The concept of the expert system had arrived.

Expert Systems Basics

The central concepts of expert system development go like this. Take one or more certified human experts in a given subject, debrief them about both their knowledge base and their search strategies. Keep those two sets quite separate. Use the one as the start of your database, and the latter as the kernel for your inference engine. If you will keep the specific database and your strategies for manipulating that data distinct, you keep open the possiblity of using an expert system shell in several different areas of expertise by simply varying the database.

Next, decide how you will represent the knowledge your expert has in a form the computer can understand without distorting what your expert knows. For example, if you wanted to develop an expert medical system, you might hear from your expert that "usually a sore throat and a fever means the child has an infection... but occasionally it might mean ingestion of a toxic substance." Now just what do you want your computer to do with "usually" and "occasionally"?

At this point you begin an extended dialogue between the expert clinician and the expert system expert. We can tell you from the expert clinician side that some of the most exciting impact of AI occurs right here. If the dialogue goes well, each expert, both clinician and programmer, will learn an amazing amount about how they ply their trade.

A neophyte professional starts out in his or her trade with a fairly clear set of basic rules and a small experiential database. As they gain experience within their microworld, they amass hundreds of exceptions to the original rule set as their event database grows. Repeatedly useful actions gain power and extension, unsuccessful choices extinguish certain behaviors (see section). As their expertise appears more and more profound to others, the details of the decision making process become fuzzier.

Now, in order for the two experts to build a useful expert system, they must reach an agreement on representation and the underlying statistics. They must also set up the boundary definitions for the program just like we would say "yes, I consider him an expert in neurosurgery, but not in diagnostic neuropsychological evaluations." This central area of knowledge representation and identifying expert boundaries will form the focus for our next column.

Late News

Before we close down for this issue, we'd like to pass on two items. First of all, we had a delightful phone conversation with Denison Bollay, president of Expertelligence. It appears that a number of exciting programs will meander into the Macintosh community from several different sources over the next year. As these become available we'll take a look at them and review them here ASAP.

Also, just before press time the copy of Dan Shafer's book *Artificial Intelligence Programming on the Macintosh* (8) arrived. It uses ExperLogo as the demonstration language, goes through basic to intermediate level AI concepts, discusses the strengths and weaknesses of various languages when asked to "do AI," shows how to convert ExperLogo programs into Microsoft Basic 2.0, and has an excellent discussion of the ways a particular language may influence the way you conceptualize a given problem. We shall review the text more completely another day, but at first blush it looks like an excellent investment.

Definitions

Okay, here we have a host of those cute little terms we used up above. As we go along with this column do let us hear whether we need to do more or less defining and explaining of basic concepts.

Search:
The concept of a search plays a central role in AI. Most AI efforts focus on problems, a search for a solution to that problem or class of problems, *and* performing the search as easily and quickly as possible.

Search space:
The total set of possible solutions to a problem.

Depth-first search:
This technique starts down a particular subset of solutions or steps to a possible solution and keeps plugging along till it either hits on the answer, or runs out of possibilities and has to start over again with another series. It can lead to long series of questions that even a novice would skip once s/he saw the response to a few crucial questions.

Event database:
You will not find this one in your friendly dictionary. We use this term to codify the following sequence. For us creative, survival oriented behavior centers on a five step recursive algorithm. A living organism (1) senses a local external environment, (2) creates an internal (mental) representation of that environment, (3) reaches out and does something to the external environment, (4) senses the response, and (5) modifies the internal environmental representation. Notice that by the time you reach step 4 you have started to repeat the sequence with a modified database, hence the recursive nature of the algorithm. Each pass through this recursive process we call an event. Notice the tight linkage between the database of events and the way the inference engine (the sensing, acting entity) operates.

Intelligence:
You won't believe we want to take a shot at defining this one. After years of work in medicine and psychiatry, the best account to date began with a comment by a character in a Robert Heinlein

novel: intelligence (genius he actually said) = a combination of laziness, desire, and novelty. I want to sit on my front porch, I want to mow my lawn, and I want both to happen with less effort than anyone has every witnessed before. That type of processing pervades most AI search strategy activity.

Heuristics:
A plural noun often used in programming to refer to all those vaguely defined, hard to quantify, vitally important aspects of our daily decision-making strategy, e.g. rules of thumb, experience, intuition, or insight. Standard algorithmic methods rely on specific formulae and precisely quantifiable variables. Heuristic methods try to save time and memory by placing certain constraints on a search strategy.

Inference Engine:
The logic, rules of thumb, experiences developed by an expert in the pursuit of his craft over a period of years. Often harder to define about yourself the longer you have functioned at an expert level. See the concepts outlined under heuristics.

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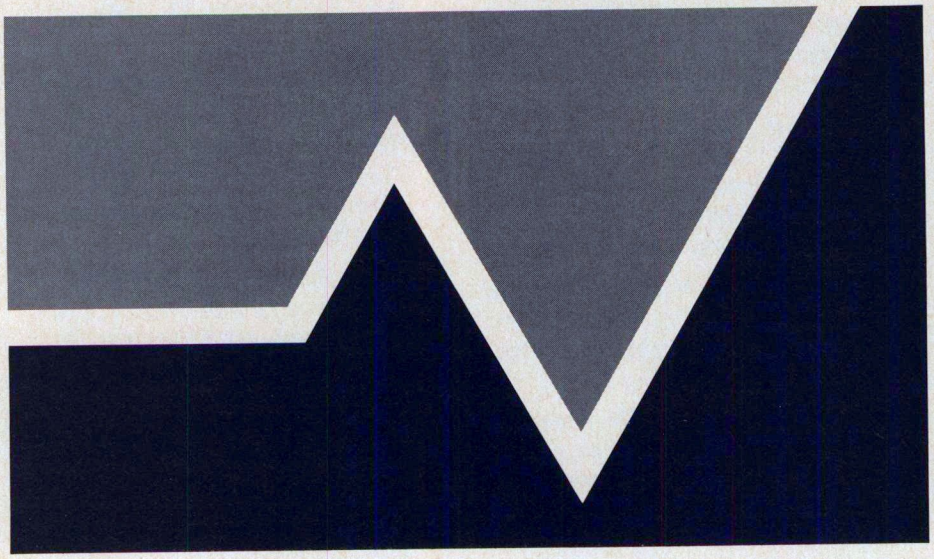

Bruce F. Field

FIXING PRINTER PROBLEMS

Chuck Cronan of Shorewood, WI, wrote to describe a procedure he used to fix printer problems he was having with version 1.1 of AppleWorks.

"Having acquired an AppleWorks program and since my system includes a Grappler+ interface and Panasonic printer, I, too, was plagued by the cursed 80N appearing at the upper left of printed data base and spreadsheet reports. However, I solved the problem without the help of Apple's modification program.

"From other sources I discovered that the problem was only on the STARTUP disk. By brute-force I looked at each file on STARTUP (the SYS files all load at $2000 or 8192 decimal), byte by byte, using a short BASIC program, looking for three sequential bytes which spell "80N"; in decimal that is 56, 48, 78. I was lucky that it worked and didn't take more than a few minutes. If you work from a copy (please!, not the original) of STARTUP, you will find four applicable bytes:

1. BLOAD APLWORKS.SYSTEM, TSYS, A$2000

Address	PEEK	Character	POKE
11557	9	ctrl-I	0
11558	56	8	0
11559	48	0	0
11560	78	N	0

2. POKE null characters (decimal zero) in the four addresses shown. This is the string sent to the printer.
3. BSAVE APLWORKS.SYSTEM, TSYS, A$2000, L$1DF4

"That's it, it'll work like a charm. Evidently, the ctrl-I character acts as a command to my Epson-like printer. In my case, my Panasonic interprets it as its ASCII equivalent, HT(=TAB), My printer skips eight spaces (default TAB) and prints the string "80N." The patch above results in a string of nulls sent to the printer, resulting in nothing! Other interface/printer combinations may require different pokes; experiment, if necessary, but use copies of all three disks."

Thanks for the information Chuck, however let me remind everyone that version 1.2 of AppleWorks (which is available from your dealer) has a menu option that allows you to set the printer startup string to anything or nothing. Choose (5) Other Activities from the Main menu, and (7) Specify information about your printer(s). Go through the procedure for adding a printer until you reach the Add a Printer menu to specify line feeds, top-of-page, etc. and choose (5) Interface cards, at which point you can enter whatever startup string you wish.

THERE IS A CURE FOR YOUR ILLNESS

Q. *I have an Applewriter IIe program which makes me ill due to its printing of mouse characters on the data line at the top of the screen of my enhanced IIe. Where can I insert a POKE 49166,# or PRINT CHR$(24) to get away from that alternate character set? Would Apple Writer's WPL help? I cannot use Apple Writer under the present circumstances—it's too frustrating.*

A. The problem is slightly more difficult than inserting a single POKE. However, Steven Meuse published a short BASIC program in *Nibble* magazine, April 1985, pp. 63-64, that will fix the problem of mouse characters being displayed on the status line as well as being displayed when the cursor is over a capital letter. He also modified it to permit selection of 40-column text display even when an 80-column card is plugged in the machine.

APPLESOFT DOESN'T SUPPORT HI-RES

Q. *My Apple extended 80-column card will provide double-hi-res only for Revision B or later IIe's. The 80-column card manual was copyrighted in 1982—my IIe was assembled in 1985 (enhanced) but the main board is a Rev. A. What gives? Can I complain?*

A. Good question. For a short time after the introduction of the *IIe* (early 1983) Apple was shipping *IIe*'s with Rev. A boards that did not support double-hi-res graphics. By May 1983 they were shipping Rev. B boards and offered to swap Rev. A boards for Rev. B if you could show that you had an extended 80-column card (any brand). I suspect that your Rev. A board may actually be Rev. B in disguise. Beg or borrow an extended 80-column card and try it out. You will either need to program in assembly language, or buy one of the drawing programs that works with double-hi-res, as Applesoft doesn't support double-hi-res.

UPGRADE TO VERSION 1.1.1

Q. *I bought one of the first IIc's from a big Apple only retailer because of its "compatibility" with my office machine, an early IIe. The salesman didn't know the meaning of the word, apparently, but after a year of fiddling and upgrades I finally have the little turkey doing most of what I want it to do. The dealer sold me Mousepaint and, somewhat later, the ProDOS Users Kit for use on both machines. Neither seems to work well on the IIe. He said they are the right versions, but. . . Both programs are based on ProDOS 1.0.1 (dated 1/1/84) and specify II+ or IIe computers, but not IIc on the packaging. I note that the IIc System Utilities use ProDOS 1.0.2 (dated 2/15/84). Can you tell me if 1.0.1 is a correct ProDOS for the IIc?*

A. The latest version of ProDOS as of this writing is 1.1.1 and this fixes several bugs in the previous versions.

UPGRADE AND USE DISK ZAP

Q. *How can I instruct Applewriter II to activate my 80-column firmware in my IIe? Activating (PR#3) before booting the disk does not work. I suspect that adding a statement to the Hello program to activate the firmware on my 80-column card would allow this. Unfortunately the program is in binary format under DOS 3.3 and also includes a control character in the file name. I have tried adding a new Hello program to initialize the firmware to 80-columns, then BRUN the first hello program. The problem is that I cannot rename the binary file.*

A. There is no simple way to use Apple Writer II in the 80-column mode on your *IIe*. Apple Writer bypasses the normal text output routines and writes text directly to the screen; thus enabling the 80-column card before starting Apple Writer will not work. Some manufacturers of 80-column cards, Videx in particular, offer a pre-boot disk that modifies Apple Writer II to work with their brand of 80-column card. I don't know of a patch for the *IIe*. One solution is to upgrade to Apple Writer *IIe*.

As far as modifying file names in the DOS 3.3 directory, a disk zap program that allows you to edit any sector on the disk can be used to directly modify the directory on the disk. The directory starts at track $11 (17 decimal), sector $0F (15 decimal) and contains 7 filenames per sector proceeding down to track $11, sector $00. For the user who does not wish to get his/her hands "dirty" with such detail, James E. Hopper wrote a program to edit or delete any filename in the directory. This program appeared in *Call-A.P.P.L.E. in Depth, Volume 3, "All About DOS,"* pp. 143-153, and is also available from A.P.P.L.E. Co-op on diskette if typing in assembly language programs is not your favorite pasttime.

THE ENTIRE MEMORY IS CHECKED

Q. *On my enhanced IIe, when I hold down the control key, closed-apple key, and reset simultaneously, the computer does a diagnostic check of read/write memory. But, does it also check the memory on the extended 80-column card plugged into the auxilary slot?*

A. Yes, if the card is present it checks the entire memory on the card. From a disassembly of the firmware in the unenhanced *IIe* it appears that it also checks the extended 80-column card.

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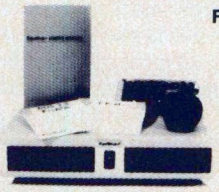

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Views From A "Loyal Oppositionist"

Does it sometimes occur to you that our Co-op, though providing much of value, might be becoming less of a "Co-op" than a "distributor," more a vendor-based group than a user-based one? Do you think that getting information on the activities and issues confronting our organization, as well as the user community, is really a matter to be decided on the basis of "reader-service card popularity" (ref. 1986 Annual Report)? Are those "new sounds" that Don Elman seems to hear from Apple Inc. (*Inner Circuit*, March 1986) really "user music," as he is so quick to proclaim, or just another lullaby? After years of serious user-abuse, shouldn't our Editor be a little more cautious before dancing to a new tune that experience suggests might be less sound than "sound and fury . . .?"

Is our Co-op really doing what it should by way of advising us on the real issues and directions in both its own and industry policy? More important, is it really consulting us (reader cards and surveys notwithstanding) on our needs and desires or aggressively pursuing advocacy of users on our behalf? Do you know, for example, that one of Apple's "new sounds" is to set up a program of "certifying" Apple user-groups? Groups which qualify (and qualification may appear very benign . . . in the beginning) will, of course, get some special privileges from Apple. But have you ever had to deal with Apple's endless "are you a certified developer?," "have you gone to your dealer" stonewalling when in need of information or remedy to a problem? Do you feel in charge of the situation? What do you think it will be like when user-groups call and have to come up with their "name, rank and certification status?" Do you think, maybe, Apple has other intentions than the sound of "insuring high user-group quality" (and what business is the quality of our user group to them?)

Have you ever tried to get a small repair part, like a keyswitch, through their "dealer support system" and found that not only wouldn't the dealer sell you one (and have Apple Inc. duck under the rug of "dealer independence") but that their price for fixing the machine would make an auto repair shop blush (in this case, a median $50.00 minimum bench-fee for a 30 cent part and a 10 minute, two-point solder job). Have you ever questioned whether "market support" philosophies, rather than user support, is really more profitable? Or how the decisions that make it necessary to buy solutions rather than create them come to be? For that matter, has our Co-op ever seriously challenged Apple's clever decision to make dealers (whose business is to sell things) the sole access for users whose need is to solve problems?

Do you wonder if, just possibly, "cost-cutting" sounds (ref. Annual Report, etc.) might have a little of the same melody for us as users that "high-quality" and "market integrity" have for us as consumers? There is nothing wrong with unopposed elections, per se, and I've no doubt our staff is as hard working and capable as any. Still, with such important issues for the future of our participation in an information society (not to mention our pocket books), it does seem strange that there is no contest to a single set of assumptions and directions, no matter how good they may sound. Are we perhaps a little too isolated from our own workings? Or, are we kept a little too insulated from them?

Did you know, for example, that the Co-op has no specially assigned staff or volunteers to oversee and conduct the business of developing and expanding our (rather paltry) PDS libraries? Should our recourse to "buying solutions" take a priority over first trying to provide access to the thousands of "free" solutions that may exist? Do you notice how frequently our "support" articles and technical help features really sell more products in one form or another? Have any of you ever written Dick Hubert and raised some of these concerns and found, besides not getting any response, that the next issue of the magazine had some completely irrelevant "testimonial" to Apple Inc.?

Many of you must have your own lists of issues and questions and, like myself, are ultimately directed toward wanting both the Co-op and Apple Inc. to be the best and most supportive organizations possible. Clearly, one point of view cannot maintain a healthy perspective forever. If our presenting organizations have weaknesses and faults, they at least have a good excuse. We, as users and consumers, do not. Information management and use is our specialty. At whatever level it is the single interest that brings us together, and few of us are so naive as to believe that the issues of policy and decision that provide that service are really far removed from "how do I get my printer to work?" or "learning how to take control of your screen character output." The identification of industry behaviors and the refinement of our needs and arguments has too long gone, by default, to the accounting and marketing departments of our own organization, not less than the OEM's and vendors. Do you think, maybe, it's time to examine some of these issues and balance the "balance-sheets" with our needs and intentions?

I would very much like to hear from any and all who share similar thoughts or have ideas on such matters. I am not in a position to really organize a needed appraisal or directions of action, but I can promise to examine your input carefully and try to cull its experience and contributions, and report back on what seems to be our thinking and what kinds of talent and interest might be put to work on these concerns.

Larry Brockman
PO 5579
Sacramento, CA 95817

Dual Response

I would like to respond to two readers from the April 1986 Write -A.P.P.L.E.: "Some Further Thoughts on Piracy" by Daniel Parker and "Hackers to the Rescue?" by Hal Barwood.

You have a very well constructed plan, Daniel. The only flaw I can see—and it's not with the plan—is that most software companies will probably not want to be the first one to put this plan into action. They will wait for other companies to lower their prices, halt work on protection schemes, and give up the hunt for "pirates." I do agree that if these companies would cease to spend money on losing battles (almost everyone knows there is no such thing as a "fool-proof" copy-protection), they could cut their costs significantly enough to offer good-quality software that the public could afford to buy. I'm not saying that all software is too expensive. No, it's just that the average Apple owner doesn't want to spend $60 on a piece of software knowing there is a good chance they won't need it; especially when they can get the same software for free.

Hal, if you need a word processor for writing, may I suggest "The Bard's Pro-Am Writing System." It's great for writing letters, reports, and anything else. It comes with three disks (6 sides): Apprentice/Experienced levels, Tutorial, 40/80 Column Professional Levels, Sample Work Disk, and a 50,000+ Spellchecking word list. Writing Software International's word processor sells for $69.95 and is very well worth the price.

Dave Harkness

For more details on this word processor, see Writing Software International's ad elsewhere in this issue. Our technical staff has looked at it and also feels it is a good value.

Calendar Debugged

I am sorry that a bug and a typographical error appeared in the program Adjustable Planning Calendar which I wrote and you so kindly published in your July 85 issue.

Line 690 should read:

```
690 YR = VAL (R$)
```

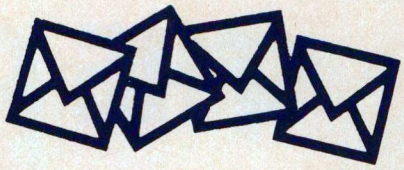
Line 1140 should read the same except the GOTO 1230 should be GOTO 1160:

```
1140    IF NOT F1 THEN PRINT
        ":";MS + I; SPC( 19 - 2 * WL
        + (MS + I < 10 ));M$(NM);:F1
        = 1: GOTO 1160
```

Thanks to Mr. Herb Olnick for bringing the problems to my attention.

Harold Shuckhart

LETTERS POLICY



Call-A.P.P.L.E. welcomes letters from its readers on any topic relating to the magazine's content, A.P.P.L.E. services, experiences with hardware and software, current issues in computing, or programming notes. Because of space limitations not all letters can be selected for publication or printed in their entirety, but we try to present a representative sample of your views. If you would like your address published, please include it near your signature.

Send to:
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290 S.W. 43rd St.
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PROGRAMMERS: New DAVID-DOS II™

HIGH-SPEED DOS 3.3
DOS-MOVER/FAST-GARBAGE

Makes high-speed disk access under all conditions. DOS-mover frees 10,000 bytes of extra memory for programs. FRE command does ultra-fast garbage collection. Clock or manual disk dating. May be licensed.

100 Sectors in 7 Seconds

Speed Load/Save Applesoft, Binary & Integer 100 sector programs in 7 seconds. Tload/Tsave Random & Sequential Text Files at same speed. Speeds up programs like Home Accountant.

10K More Memory

Use HIDOS command in hello program for turnkey startup, adding 10K free memory to run 30% larger Applesoft programs than ProDOS. Moves DAVID-DOS II and 4 buffers above main memory.

Ultra-Fast Garbage

New FRE command collects a memory full of 6000 strings that are half garbage in two seconds. DOS 3.3 takes 12 minutes. FRE is so fast it is not noticeable during run of most programs.

Clock Dating

Automatic date stamping of disk files is set up for 6 kinds of clocks or Hello manual date entry. New DATE command will auto-insert date in correspondence.

All times in seconds. (Time Test programs available)		DAVID DOS-II	ProDOS	DOS 3.3
TEXTFILES (100 Sectors)	TSAVE	8.0	NO	NO
	TLOAD	6.2	NO	NO
(791 Strings, 32 chars ea)	WRITE	29.3	28.0	88.4
	READ	24.3	16.3	83.8
	PRINT/READ	44.2	45.9	117.1
(442 Sectors, 7 x 500)	APPEND	142.3	142.9	1231.2
APPLESOFT (100 Sectors)	*SAVE	6.4	16.4	33.1
	LOAD	5.0	4.0	23.5
INTEGER (100 Sectors)	*SAVE	6.6	NO	33.4
	LOAD	4.9	NO	23.4
BINARY (100 Sectors)	*BSAVE	7.3	18.4	28.7
	BLOAD	5.8	4.8	24.5
48K PROGRAM SPACE (With 3 Bufs avail)	APPLESOFT	36,352	NO	36,352
	INTEGER	36,352	NO	36,352
	BINARY	36,352	34,816	36,352
64K PROGRAM SPACE (With 4 Bufs avail)	APPLESOFT	46,592	32,256	35,756
	INTEGER	46,592	NO	35,756
	BINARY	46,592	41,728	35,756

*Add 5 seconds for Verify. Apple II, Applesoft & ProDOS are trademarks of Apple

Ten New DOS Commands

1. HIDOS moves DOS above 48K memory.
2. FRE makes ultra-fast garbage collection.
3. DATE stamp files. Clock or manual dating.
4. TLOAD speed loads all Text Files to mem.
5. TSAVE speed saves Text Files from memory.
6. TLIST lists all Text Files to screen/printer.
7. DUMP Binary/Ascii to screen or printer.
8. DISA disassembles Binary to screen/printer.
9. AL prints program Address & Length.
10. / is a one keystroke Catalog.

Identical Operation

All new commands operate identical to old DOS commands on the keyboard & in programs.

Install in Three Seconds

Install DAVID-DOS II on your full disks in three seconds without touching the programs. Create bootable high-speed new disks with a Basic, Binary, or Exec Hello & 35/40 tracks. Create Data-Disks with 30 extra sectors.

Variable Speed Scrolling

Key operated variable speed scrolling for TLIST, DUMP and DISA. Lower-case accepted on all commands. Catalog shows Free-Space. Automatic support of Integer or Applesoft Card in any slot, while in HIDOS or LODOS. Vendor license includes protection system.

Compatible

All DOS entry addresses have been preserved. DOS is same length and compatible with most software. David-Dos is fully copyable. Init areas were used for David-Dos. Works with all Apple IIs including IIe, IIc, Franklin & Basis with 48K/64K/128K & Corvus & Xebec Hard Disks. Complete documentation and many utilities are on the disk.

Add $2.00 Shipping. Overseas add U.S. $4.00. Calif. add 6%. **$39.95**

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DAVID DATA™

CIRCLE 20 READER SERVICE CARD

THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by A.P.P.L.E. Further information about items appearing in The Marketplace can be obtained through the Reader Service Card. If you contact any manufacturers directly, please mention that you learned about them in *Call-A.P.P.L.E.*

VOICE EDITING PROGRAM

The Amazing Musical Instrument Company announces the first musical program from Nexus Computer Consultants—the FM Drawing Board. This program visually displays sound waves to facilitate precise analysis and editing of FM synthesis sounds.

Key Features:

Harmonic Analysis
Operators are examined in pairs to fully illustrate frequency modulation. The two operator envelopes can be sampled simultaneously at any chosen point in time. The resulting harmonic spectrum is displayed as a bar graph. The taller the bar, the louder the harmonic. The amplitudes of each harmonic over the entire duration of the envelope can be plotted at once using a very powerful analyzer: Autoscan.

The Descrambler
The FM Drawing Board provides a new order for the 32 DX-7 algorithms with The Descrambler. The algorithms are ordered according to similarities in patch networks and relative operator positions.

Envelope Analysis
The FM Drawing Board provides some new analysis tools which enhance your understanding of the operator envelopes. To quickly view the effects of changing a parameter on the shape of the envelope, the FM Drawing Board gives you Autosweep.

Keyboard Scaling
For any operator the FM Drawing Board can draw six envelopes—one for each C note on the keyboard, illustrating the different shapes caused by that operator's Keyboard Rate Scaling parameter.

DX-7 Communication and Disc Storage
The FM Drawing Board communicates fully with the DX-7 on both the Roland MPU-401 and Passport interfaces. Individual voices and entire voice banks, including function parameters, can be transmitted between the DX-7 and the FM Drawing Board (both ways!) This means that sounds are the same each time, thereby insuring consistency of voice reproduction.

Individual Operator Copying
Another exclusive feature of the FM Drawing Board is COPYOPS. When copying voices from one position to another within a bank or between banks, the user can specify what portion of the voice data is to be copied.

"Common" parameters, "Function" parameters and individual "Operator" parameters can be selectively copied from one voice to another.

With the FM Drawing Board it is now possible to make sense of that maze of numbers and create the sounds that *you* want to hear! Price $200.00 each. *The Amazing Musical Instrument Company, 290 Shuter St., Toronto, Ontario Canada M5A 1W7 (416) 368-3462.*

CIRCLE 42 READER SERVICE CARD

UPDATE

StyleWare's MultiScribe Wordprocessor using Mac-like features announced in the May 1986 Marketplace is currently priced at $59.95 plus $3.00 shipping and handling.

GAME KEEPS UP WITH CURRENT EVENTS

MicroProse Software, Inc. is preparing a factsheet update for the Libyan mission section of the Flight Operations Manual that is provided with the computer software simulation "F-15 STRIKE EAGLE".

The purpose is to document some of the key events in the April 14, 1986 U.S. air strike against Libya as that incident relates to the Libyan air combat mission already contained in F-15 STRIKE EAGLE. The factsheet will provide background information and an updated map, along with suggestions on how to use various parts of the F-15 program's seven missions to gain insight into the recent raid. The software program itself remains unchanged.

F-15 STRIKE EAGLE's current Libyan mission is based on a real 1981 incident. It involved a U.S. Navy task force that was provoked into action after beign harrassed by Libyan aircraft while on training exercises in the Gulf of Sidra. Although that conflict was confined to air-to-air-combat event, F-15 STRIKE EAGLE author, Sid Meier, decided to broaden the simulation possibilities by adding several Libyan ground targets as well. These targets happened to include airfields at Tripoli and Bengazi, Qaddafi's military command center, and a scattering of Libyan anti-aircraft surface-to-air (SAM) missile sites. Price: $34.95. *MicroProse Software, Inc., 120 Lakefront Drive, Hunt Valley, MD 21030.*

CIRCLE 43 READER SERVICE CARD

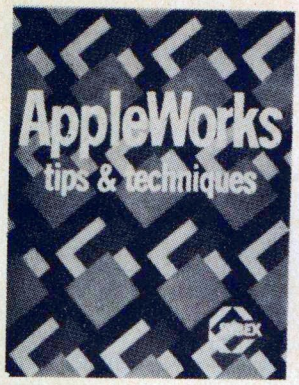
WAR OR PEACE

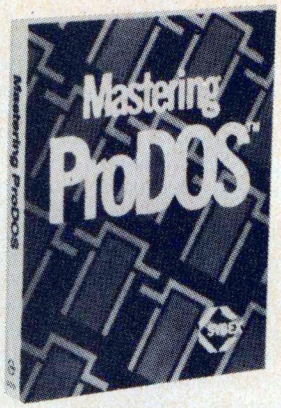
Bright Ideas has recently developed a computer simulation program, *War or Peace: Decision-Making in a Nuclear Age*. The simulation stimulates discussion of the role nuclear weapons play in national security. It gives participants the opportunity to assume the role of high-level decision-makers in the Soviet Union or United States.

War or Peace: Decision-Making in a Nuclear Age comes with a Student Briefing Book, appropriate for most high school students. An advanced Briefing Book, with a more detailed introduction to national security, also accompanies the program. There is a Teacher's Manual containing several lesson plans, and discussion questions. Price: $49.95, $5.00 s/h, $2.00 COD. VISA/MC accepted. *Bright Ideas, 52 Exeter St., Portland, MA 04102, 1-800-628-2828 ext. 649.*

CIRCLE 44 READER SERVICE CARD

TWO NEW COMPUTER BOOKS





AppleWorks: Tips and Techniques

Sybex Computer Books releases a book covering intermediate and advanced levels of the Apple program AppleWorks. This book puts an emphasis on enhancing management capabilities in a broad range of applications. It is designed to help users who are already familiar with their Apple systems to improve their skills in any or all of the three modular categories of AppleWorks: the word processor, the data base, and the spreadsheet.

The contents concentrate on information for the utilities within the AppleWorks system. Specifically, this books details ways to transfer information from module to module, how to organize the desktop for the most efficient RAM use, how to install a wide variety of printers, accessing online information sources, and other lesser known possibilities. Beginning, intermediate and advanced users of AppleWorks and III E-Z pieces will find value in this book. Price: $18.95.

Mastering ProDOS

Sybex Computer Books releases a companion volume to their earlier book THE PRODOS HANDBOOK. This book explains in greater depth and detail the operating structure of Apple's proprietary disk operating system. This book contains approximately 50 utility programs which enable the reader to manipulate his or her system and gain maximum benefit from it. Example programs have been written in both BASIC and assembly language, so the reader is further educated with those techniques.

Readers who are intermediate and advanced programmers will find an immediate appeal in this book, but the large established base of Apple systems, particularly of //e's which have upgraded to ProDOS, make this book a useful text for beginners as well who are eagerly looking for ways to put their new chip-power to use. Price: $19.95. *SYBEX, 2344 Sixth Street, Berkeley, CA 94710, (415) 848-8233.*

CIRCLE 46 READER SERVICE CARD

ADD FULL COLOR VIDEO TO YOUR COMPUTER

AVAS Corporation announces the TELEcomp 2000. This newest addition to its computer/video line allows the user to add full color video from a VCR, video camera, video disc or any other video source to the output of a microcomputer. The combined signal may be recorded on video tape, displayed using a monitor or video projector, printed with a video printer, broadcast, or transmitted by satellite.

TELEcomp 2000 is a stand-alone device. All signal processing is done within the TELEcomp 2000. No software is needed to drive the system, leaving the computer free to run any software the user requires.

TELEcomp 2000 incorporates a number of special features designed to add to the product's overall versatility. These include full window control, opaque or transparent overlay selection, overlay intensity control, switchable video source selection, digital RGB to analog RGB or composite video conversion, and composite video to analog RGB conversion.

TELEcomp 2000 is available in two models. The TELEcomp-2000M combines monochrome computer output with any color video source and sells for $995.00. The TELEcomp-2000C combines color computer with any color video source at $1595.00. TELEcomp and a complete selection of companion products may be obtained from *AVAS Corporation, 196 Holt Street, Hackensack, NJ 07602, (800)631-0868 or in NJ (201) 487-6291.*

CIRCLE 47 READER SERVICE CARD

Snapshot and the Art of Apple II Switching

The Snapshot card unleashes your Apple's hidden power to interrupt -and-resume any running program. When you load up Snapshot's on-board RAM with one of Dark Star Systems' growing family of easy-to-use, menu-driven software packs, you get awesome switching power at the press of a button....

Switch 1 The Snapshot Shuttle is an Apple II Switcher that lets you keep up to four different programs where you can access them instantly — in your RAMcard. That means no more waiting for disk I/O. And armed with the Shuttle, you can interrupt a program and resume running it at exactly the same point, so there's no time-wasting search for where you left off. Use the Shuttle to switch among your wordprocesser, database, spreadsheet and comms programs — or *any* applications you like. The Shuttle's great for program development too. It lets you switch among operating systems, from any language to your compiler, editor, assembler or debugger — back and forth between *all* your favorite programming tools in fact.

Switch 2 The Snapshot Printerrupt lets you interrupt *any* running program, print its display using a galaxy of great menu options, and resume running it as though nothing happened. Use it to view and print both MousePaint screens; crop text and graphics; expand graphics; rotate left and right; invert and shade; print Pages 1 and 2 side-by-side, or *and*, *or*, and *xor* them; set dot-density; check the form position; auto-center, and adjust margins — you name it, you can do it with the Printerrupt.

Switch 3 The Snapshot Copykit lets you make archival backups of your copy-protected software. It will copy total-load programs up to 128K in less than 25 seconds, and it's invaluable for backing up multi-access programs too. The Copykit's *fast* saving and loading of total memory saves hours when you need to work with spreadsheets or other programs that take an eternity to handle large files. And the Copykit lets gamesters start the action at those hard-to-reach high levels *every* time!

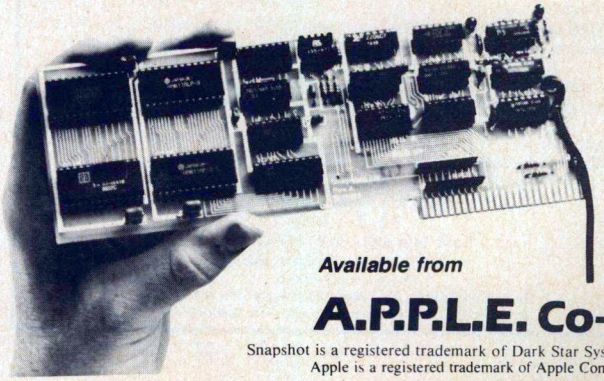
Switch 4 The Shell is the memory-manager and mini operating system which allows Snapshot software to work within an interrupted program. Use it to write your own machine-code or Basic Snapshot program. It could be a great debugger, a comms program, or even a neat little game. Whatever your Apple's doing, the Shell lets you suspend it and get your program up-and-running at the press of a button.

Snapshot and its software packs are compatible with the Apple II+ and //e, all the popular 80-column cards, memory cards, printer cards, and graphics-capable dot-matrix and ink-jet printers. The system comes with 12 months warranty and free tech support, and Snapshot program disks can be upgraded inexpensively, so they need never be out-of-date.

Use the A.P.P.L.E., Co-op order form in this issue to place your order or call

1-800-426-3667

In Washington State call (206) 251-5222
Price **$139.00** to A.P.P.L.E. Co-op members — **$152.90** to non-members (Price includes Snapshot card with Shuttle, Printerrupt, Copykit, and Shell software packs.)
Product code: HSHUTL
Shipping Weight: 24oz.



Available from

A.P.P.L.E. Co-op

Snapshot is a registered trademark of Dark Star Systems Ltd.
Apple is a registered trademark of Apple Computer, Inc.

CIRCLE 19 READER SERVICE CARD

EVERYBODY'S PLAN

ABRACADATA introduces two complete programs, *Schedules* and *Flowcharts*, which let you plan and depict any kind of project or process. Complete with pull-down menus, quick command cards, and two simple tutorials help you understand the basics of planning right from the start. The manual covers every aspect of creating project plans and flowcharts.

Schedules

With Schedules you plan your projects right on your computer screen, entering Tasks, Resources and Milestones. The program highlights the critical path and gives early and late start and finish dates. Then, from your basic project chart, seven different reports allow you to see your project from different perspectives.

Editing features allow you to change, delete, undo, add to, or rearrange any part of your plan. And you can change the starting date and on/off days, or create an alternate calendar, so you can easily consider different schedules.

On-screen commands (your option), help screens, and a step-by-step tutorial let you start creating Schedules without spending hours with the manual.

Unique slack time analysis differentiates Resource Slack (when a resource is done with a part of a task, but the task isn't done because other resources are still at work) and Task Slack (when the task requires fewer days to complete than the schedule allows, so its resources are available).

Flowcharts

Easy drawing is the joy of Flowcharts. If you can press a key, you can create a chart. A special continuation feature allows you to create as big a flowchart as you have empty data disks available.

Use up to twenty standard flowchart shapes. Rotate them, and select from among nine different sizes for each. You can place small, normal, or bold type on the screen either vertically or horizontally.

Our Activation feature enables you to "see the flow go." Use different colors to depict any number of flow sequences.

Editing is easy with undo, area erase and area moves. Price: $99.95. *ABRACADATA, P.O. Box 2352, Eugene, OR 97402, (503) 342-3030.*

CIRCLE 48 READER SERVICE CARD

APPLE(II+)WORKS

PLUS-WORKS™

It Really Works!!

PLUS-WORKS not only allows you to have all features of AppleWorks™ on an Apple II™, II+ or compatible, but our extended memory versions give you capabilities far beyond the standard IIe/c versions. Its great for expansion on the **Apple IIe** as well.

Compare these features with other AppleWorks patch programs

- Copyable - make backups, transfer to hard disk
- Up to 1 megabyte of **desktop** space available
- Database expansion to more than 4,200 records
- All control codes available to printer
- Supports Franklin computers and all full ASCII keyboards
- Supports all major 80 column cards
- Permanent and dynamic ram disk features
- All versions of AppleWorks supported, even V1.3
- Expand AppleWorks desktop into CP/M ram cards
- Optional patch to help with printer problems

•PLUS-WORKS - $19.95 plus $3.00 ship/hand. Requires AppleWorks, 64K Apple II+ or compat, 80 col card and shift key mod. Maximum desktop 10K. You may upgrade to XM for $30.00 at any time.
•PLUS-WORKS-XM - $49.95 plus $3.00 ship/hand. Requires same as above with legend, saturn, or compatible ram card(A.P.P.L.E. Big board, know Drive, prometheus, etc), Apple Computer's memory expansion card, Microtek ram card, Orbital disco-ram, PCPI Applicard, Micropro Star card, IBS AP33 ram card, or Apple IIe with ramcard.
•PLUS-WORKS-L - Special version for Laser 3000, 10K desktop - $19.95 plus $3.00 ship/hand.

•Special combination offer - PLUS-WORKS-XM & 256K Apple Memory expansion card (expandable to 1 megabyte) - $295.00

MC/Visa add 4% **Orders only 1-800-221-3826**
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Dealer inquiries invited
Apple & AppleWorks are trademarks of Apple Computer Inc.
PLUS-WORKS *is a trademark of Norwich Data Services Ltd.*

CIRCLE 31 READER SERVICE CARD

AN EASY DATA BASE PROGRAM

Sunburst Communications and Bank Street College of Education announces the BANK STREET SCHOOL FILER, a database program easy enough to be learned by a fourth grader, yet sophisticated enough to satisfy an advanced user. Designed by Bank Street College and Franklin E. Smith, the school package includes many new features to help teachers develop critical thinking skills in the classroom.

Available for both the 64K and 128K Apple Systems, the SCHOOL FILER package consists of a School Filer Disk and back-up, a Tutorial Disk, and complete Reference Manual plus a Teacher's Guide, Classroom Tools Disk, and a School Database Disk. The detailed Teacher's Guide includes tutorials, lesson plans, reproducible activity sheets and suggestions for classroom management. Many of the activities featured in the Teacher's Guide are correlated to specific files on the School Database Disk.

Sunburst will also release the BANK STREET BEGINNER'S FILER for early elementary students and a collection of database disks, including one on North America, one on Animal Life, and another on Space and Astronomy.

Teachers and students will particularly appreciate the program's unique sorting and searching functions. Instead of the usual complicated computer commands, simple English-language sentences are used to sift through and organize data.

Following are a few more special features:

- Make Changes at Any Time—BANK STREET SCHOOL FILER makes it easier than ever for teachers and students to create database files. It's a completely flexible tool, so users are never "stuck" with their original design. Students can add, delete, move, or change fields at any time, even after they've entered data!
- Built-In Reporting—Unlike other database programs, the SCHOOL FILER has built-in reporting features. Students can design their own reports (including tables, lists and mailing labels) with ease and print them out in nearly unlimited ways.
- Easy to Use—BANK STREET SCHOOL FILER includes all prompts on the screen so there's never anything to remember. Students will be comfortable with the SCHOOL FILER right away.

The complete database package, including the five disks and supplementary materials described, is priced at $99. *Sunburst, 39 Washington Ave, Pleasantville, NY 10570, (800) 431-1934 or in Canada, New York and Alaska call (914) 769-5030.*

CIRCLE 49 READER SERVICE CARD

PRODOS C COMPILER

WSM GROUP announces its ProDOS C Compiler for Apple *II*e and *II*c. Hyper C is a full K&R Standard C Compiler with numerous extensions such as enumeration types, bitsets and bitset operators, direct assignment of structs and arrays, nested functions, and more. Produces assembler source code. Package includes code Assembler and Interpreter, native code 65C02 Assembler, sophisticated Assembler Macro Expander, Overlay Linker, Librarian, Library Source Code, Full-Screen Text Editor, and more.

The ProDOS versions utilize a UNIX-like Shell which supports hierarchical directories. The Professional version allows for the production of stand-alone programs under ProDOS, and will allow the production of ROMmable code under any environment. No license fees for the use of the tools and source code. ProDOS Professional $99.95. *WSM GROUP, 1161 North El Dorado Place, Suite 241, Tucson, AZ 85715, (602) 298-7910.*

CIRCLE 50 READER SERVICE CARD

MAKE INTERACTIVE OR PRINTED TESTS

Edusoft announces the release of Test it!, a test authoring system for the Apple. Test It! combines two design features in one package: teachers can make printed tests with answer keys, or they can create interactive, computer tests which give students immediate feedback and store results for teacher review. Test It! lets teachers build a bank of test questions and create personalized tests.

With Test It! teachers can mix and match questions from seven subject areas. There are five different question formats: multiple choice, true/false, fill-in-the-blank, modified true/false and essay. The bank of test questions can be expanded and saved from year to year, and different tests can be designed for individual students or new classes.

Test It! requires an Apple II+, *II*e, *II*c (48K) and costs $49.95. *EduSoft, P.O. Box 2560, Berkeley, CA 94702. (415) 548-2304.*

CIRCLE 51 READER SERVICE CARD

TWO NEW STATISTICAL PROGRAMS

NCSC/NCSU Software announces its Statistical Processing System (S.P.S.) 5.0 for the Apple II + *IIe* or *IIc* format. Statistical Processing System 5.0 has been converted for use with Apple ProDOS.

S.P.S. is a comprehensive disk-based statistical analysis system for professional and research use. Statistical functions include: descriptive statistics and plots, parametric and nonparametric correlation, regression analysis, R x C contingency table statistics, Monte Carlo variable distributions, multivariate analysis, and more. The program assumes the user is familiar with statistical procedures and theory. SPS is most effective with survey databases with under 350 cases.

The program requires 64K memory, Applesoft, and one disk drive. and a monitor capable of displaying 40 columns by 24 lines. S.P.S. Version 5.0 is contained on two disks.

Psycho-Stats 3.0 is a file oriented statistical package which enables the user to perform routines on databases that include up to 30 variables with up to 400 observations per variable. Features include field manipulation (transform, subset, merge, rank), descriptive statistics, frequencies, t-tests, correlation, multiple regression, up to three-way ANOVA, and non-parametric tests. The only requirements are a printer and at least 128K memory. The Psycho-Stats Package includes two program disks and a sample data disk.*North Carolina State University, Box 8101, Raleigh, NC 27695-8101.*

CIRCLE 52 READER SERVICE CARD

COMPUTER PROTECTION

Electronic Specialists is offering a 40 page color catalog describing power line problems such as noise and high voltage spikes. Damaging and disruptive effects on Micro Computers are described. Typical computing problems and suggested solutions are included. Hundreds of protective and interference cure products are described. Request Catalog 851.
Electronic specialists, Inc., 171 S. Main St., PO Box 389, Natick, MA 01760, 1 (800) 225-4876.

CIRCLE 53 READER SERVICE CARD

MUSIC SOFTWARE FOR THE *IIc*

Passport Designs, Inc., introduces the new, intelligent MIDI PRO Interface and MIDI PRO Toolkit for the Apple *IIc* computer. The MIDI PRO Interface incorporates full sync capabilities including MIDI In/Out, Clock In/Out. Because it is software based, it is easy to upgrade and allows users full system expansion.

Passport has currently released a full line of music software for the MIDI PRO and Apple *IIc* including MIDI/4 Plus, MIDI/8 Plus, Polywriter, Leadsheeter and Utilities with MASTER TRACKS soon to follow.

The MIDI PRO Toolkit contains complete documentation on the MIDI PRO Interface; a disk with assembly language driver routines that allows two-way communication between the Apple *IIc* and the interface; object and source codes for routines modification; and an Applesoft BASIC demo program that shows how to create common computer music applications with the ability to display data sent by a MIDI instrument on the screen.

The MIDI PRO interface retails for $299.95 and the Toolkit at $25.00.
Passport Designs, Inc., 625 Miramontes Street, Half Moon Bay, CA 94019, (415) 726-0280.

CIRCLE 54 READER SERVICE CARD

NEW LEARNING AIDS

The Minnesota Educational Computing Corporation (MECC) announces Ghost Writer, a new writing tool for young authors. Ghost Writer is a utility program designed to help young writers examine their own word processed compositions for problems that often interfere with clear and effective writing. There are seven tools to analyze their works for basic elements of good writing, thus teachers are freed to concentrate on more advanced aspects of composition.

Ghost Writer (No. A-156) is designed to work with Apple *IIe* or *IIc* computers with 64K of memory and 80-column text capability. The use of a dot matrix printer is optional. This new tool comes with a support manual that provides clear instructions for easy use.

MECC also announces the release of the MECC EARLY LEARNING SERIES, a collection of software designed to help children master readiness skills in arithmetic and reading. Each of the products in the series employs delightful graphics, simple keyboard input, and entertaining themes that motivate children to use the products repeatedly as they learn. Teacher options are available which allow the programs to be tailored to the needs of individual children. Each program offers constructive feedback to assist children who may need it. There are presently five products in the series:

First-Letter Fun (No. A-154)
Using colorful, animated stories, students are encouraged to match initial sounds of words with their corresponding letters. Management options permit teachers to determine if upper- or lower-case letters are used.

Fun from A to Z (No. A-164)
Three programs challenge children to match upper- and lower-case forms of letters and to put letters in their correct alphabetic sequence.

Paint with Words (No. A-108)
This package enables children to experiment with words by creating "word pictures" that may be saved and printed with a standard printer or in color using the Apple Scribe Imagewriter II printers. The program will also work with the optional Ufonic Voice System, which provides a natural, human-sounding voice that can help children learn to recognize new words on sight.

Counting Critters (No. A-165)
Contains five exciting, colorful programs that provide practice in matching and counting numbers from 1 to 20.

Arithmetic Critters (No. A-166)
This product builds on the skills mastered in Counting Critters by providing students practice with single-digit addition and subtraction, simple measurement of lines and perimeters, and counting from 1 to 99. Colorful, motivating graphics throughout the package keeps student interest and attention.

MECC, 3490 Lexington Avenue North, Saint Paul, MN 55126, (612) 481-3500.

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LASERWRITER Connection Listing 2 Continued

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```
828F: 10          359  MISC     DFB   16          ;EXTRA STORAGE
                  360
8290: 00          361  TMP      DS    1
                  362  *
8291: 00 00 00    363  BUFF     DS    $80
8294: 00 00 00 00 00 00 00 00
829C: 00 00 00 00 00 00 00 00
82A4: 00 00 00 00 00 00 00 00
82AC: 00 00 00 00 00 00 00 00
82B4: 00 00 00 00 00 00 00 00
82BC: 00 00 00 00 00 00 00 00
82C4: 00 00 00 00 00 00 00 00
82CC: 00 00 00 00 00 00 00 00
82D4: 00 00 00 00 00 00 00 00
82DC: 00 00 00 00 00 00 00 00
82E4: 00 00 00 00 00 00 00 00
82EC: 00 00 00 00 00 00 00 00
82F4: 00 00 00 00 00 00 00 00
82FC: 00 00 00 00 00 00 00 00
8304: 00 00 00 00 00 00 00 00
830C: 00 00 00 00 00
                  364  *
                  365  ***********************************
                  366  *
                  367  * SCAN LINE ADDRESS LOW BYTE TABLE
                  368  *
                  369  YTABLL   EQU   *
                  370  *
8311: 00 00 00    371          dfb   $00,$00,$00,$00,$00,$00,$00,$00
8314: 00 00 00 00 00
8319: 80 80 80    372          dfb   $80,$80,$80,$80,$80,$80,$80,$80
831C: 80 80 80 80 80
8321: 00 00 00    373          dfb   $00,$00,$00,$00,$00,$00,$00,$00
8324: 00 00 00 00 00
8329: 80 80 80    374          dfb   $80,$80,$80,$80,$80,$80,$80,$80
832C: 80 80 80 80 80
8331: 00 00 00    375          dfb   $00,$00,$00,$00,$00,$00,$00,$00
8334: 00 00 00 00 00
8339: 80 80 80    376          dfb   $80,$80,$80,$80,$80,$80,$80,$80
833C: 80 80 80 80 80
8341: 00 00 00    377          dfb   $00,$00,$00,$00,$00,$00,$00,$00
8344: 00 00 00 00 00
8349: 80 80 80    378          dfb   $80,$80,$80,$80,$80,$80,$80,$80
834C: 80 80 80 80 80
                  379  *
8351: 28 28 28    380          dfb   $28,$28,$28,$28,$28,$28,$28,$28
8354: 28 28 28 28 28
8359: A8 A8 A8    381          dfb   $A8,$A8,$A8,$A8,$A8,$A8,$A8,$A8
835C: A8 A8 A8 A8 A8
8361: 28 28 28    382          dfb   $28,$28,$28,$28,$28,$28,$28,$28
8364: 28 28 28 28 28
8369: A8 A8 A8    383          dfb   $A8,$A8,$A8,$A8,$A8,$A8,$A8,$A8
836C: A8 A8 A8 A8 A8
8371: 28 28 28    384          dfb   $28,$28,$28,$28,$28,$28,$28,$28
8374: 28 28 28 28 28
8379: A8 A8 A8    385          dfb   $A8,$A8,$A8,$A8,$A8,$A8,$A8,$A8
837C: A8 A8 A8 A8 A8
8381: 28 28 28    386          dfb   $28,$28,$28,$28,$28,$28,$28,$28
8384: 28 28 28 28 28
8389: A8 A8 A8    387          dfb   $A8,$A8,$A8,$A8,$A8,$A8,$A8,$A8
838C: A8 A8 A8 A8 A8
                  388  *
8391: 50 50 50    389          dfb   $50,$50,$50,$50,$50,$50,$50,$50
8394: 50 50 50 50 50
8399: D0 D0 D0    390          dfb   $D0,$D0,$D0,$D0,$D0,$D0,$D0,$D0
839C: D0 D0 D0 D0 D0
83A1: 50 50 50    391          dfb   $50,$50,$50,$50,$50,$50,$50,$50
83A4: 50 50 50 50 50
83A9: D0 D0 D0    392          dfb   $D0,$D0,$D0,$D0,$D0,$D0,$D0,$D0
83AC: D0 D0 D0 D0 D0
83B1: 50 50 50    393          dfb   $50,$50,$50,$50,$50,$50,$50,$50
83B4: 50 50 50 50 50
83B9: D0 D0 D0    394          dfb   $D0,$D0,$D0,$D0,$D0,$D0,$D0,$D0
83BC: D0 D0 D0 D0 D0
83C1: 50 50 50    395          dfb   $50,$50,$50,$50,$50,$50,$50,$50
83C4: 50 50 50 50 50
83C9: D0 D0 D0    396          dfb   $D0,$D0,$D0,$D0,$D0,$D0,$D0,$D0
83CC: D0 D0 D0 D0 D0
                  397  *
                  398  * SCAN LINE ADDRESS HIGH BYTE TABLE
                  399  *
                  400  YTABLH   EQU   *
                  401  *
83D1: 20 24 28    402          dfb   $20,$24,$28,$2C,$30,$34,$38,$3C
83D4: 2C 30 34 38 3C
83D9: 20 24 28    403          dfb   $20,$24,$28,$2C,$30,$34,$38,$3C
83DC: 2C 30 34 38 3C
83E1: 21 25 29    404          dfb   $21,$25,$29,$2D,$31,$35,$39,$3D
83E4: 2D 31 35 39 3D
83E9: 21 25 29    405          dfb   $21,$25,$29,$2D,$31,$35,$39,$3D
83EC: 2D 31 35 39 3D
83F1: 22 26 2A    406          dfb   $22,$26,$2A,$2E,$32,$36,$3A,$3E
83F4: 2E 32 36 3A 3E
83F9: 22 26 2A    407          dfb   $22,$26,$2A,$2E,$32,$36,$3A,$3E
```

```
83FC: 2E 32 36 3A 3E
8401: 23 27 2B  408             dfb   $23,$27,$2B,$2F,$33,$37,$3B,$3F
8404: 2F 33 37 3B 3F
8409: 23 27 2B  409             dfb   $23,$27,$2B,$2F,$33,$37,$3B,$3F
840C: 2F 33 37 3B 3F
                410  *
8411: 20 24 28  411             dfb   $20,$24,$28,$2C,$30,$34,$38,$3C
8414: 2C 30 34 38 3C
8419: 20 24 28  412             dfb   $20,$24,$28,$2C,$30,$34,$38,$3C
841C: 2C 30 34 38 3C
8421: 21 25 29  413             dfb   $21,$25,$29,$2D,$31,$35,$39,$3D
8424: 2D 31 35 39 3D
8429: 21 25 29  414             dfb   $21,$25,$29,$2D,$31,$35,$39,$3D
842C: 2D 31 35 39 3D
8431: 22 26 2A  415             dfb   $22,$26,$2A,$2E,$32,$36,$3A,$3E
8434: 2E 32 36 3A 3E
8439: 22 26 2A  416             dfb   $22,$26,$2A,$2E,$32,$36,$3A,$3E
843C: 2E 32 36 3A 3E
8441: 23 27 2B  417             dfb   $23,$27,$2B,$2F,$33,$37,$3B,$3F
8444: 2F 33 37 3B 3F
8449: 23 27 2B  418             dfb   $23,$27,$2B,$2F,$33,$37,$3B,$3F
844C: 2F 33 37 3B 3F
                419  *
8451: 20 24 28  420             dfb   $20,$24,$28,$2C,$30,$34,$38,$3C
8454: 2C 30 34 38 3C
8459: 20 24 28  421             dfb   $20,$24,$28,$2C,$30,$34,$38,$3C
845C: 2C 30 34 38 3C
8461: 21 25 29  422             dfb   $21,$25,$29,$2D,$31,$35,$39,$3D
8464: 2D 31 35 39 3D
8469: 21 25 29  423             dfb   $21,$25,$29,$2D,$31,$35,$39,$3D
846C: 2D 31 35 39 3D
8471: 22 26 2A  424             dfb   $22,$26,$2A,$2E,$32,$36,$3A,$3E
8474: 2E 32 36 3A 3E
8479: 22 26 2A  425             dfb   $22,$26,$2A,$2E,$32,$36,$3A,$3E
847C: 2E 32 36 3A 3E
8481: 23 27 2B  426             dfb   $23,$27,$2B,$2F,$33,$37,$3B,$3F
8484: 2F 33 37 3B 3F
8489: 23 27 2B  427             dfb   $23,$27,$2B,$2F,$33,$37,$3B,$3F
848C: 2F 33 37 3B 3F
                428  *

--End assembly, 1169 bytes, Errors: 0

Symbol table - alphabetical order:

?  2M2AUX  =$81E0      A1H     =$3D        A1L     =$3C        A2H     =$3F
   A2L     =$3E        A4H     =$43        A4L     =$42     ?  ALTZP   =$C008
?  AN3     =$C05E      AUXMOVE =$C311      BCTR    =$800C      BITSPER =$8260
   BLANK1  =$8179      BLANK2  =$81F9      BUFF    =$8291      BYTE    =$8006
   CCB1    =$80C7      CH1     =$814A      CHECK   =$8143      CHRTN   =$8151
?  COL80   =$C00D      COPYPAGE=$827C      D1      =$80BF      DATA    =$C0A8
?  DBYTE   =$8008      DEND    =$80B0   ?  DINIT   =$802A      ENDARRAY=$8268
   GETAUX  =$0100      HBASH   =$27        HBASL   =$26        HEXTBL  =$8169
?  HGR     =$C057   ?  HIRES   =$C057   ?  HIRESOFF=$C056   ?  HPOSN   =$F411
   LCTR    =$800B      LINES   =$8258      LNNUM   =$8009      MO      =$8117
   M1      =$8124   ?  MISC    =$828F   ?  MIXSET  =$C053      NUM     =$8007
   OB1     =$8129      OB2     =$813A      OUTBYTE =$8128      OUTHEX  =$8152
   OUTSTR  =$8113   ?  PAGE2OFF=$C054   ?  PAGE2ON =$C055   ?  PRINT   =$8000
   RAMRDOFF=$C002      RAMRDON =$C003   ?  RAMWRT  =$C005   ?  RAMWRTOFF=$C004
?  RB1     =$80D2      RB2     =$80D7      RB3     =$80D9      RLO     =$806E
   RL1     =$807D   ?  RL2     =$8090      ROTBITS =$80C5   ?  ROWLOOP  =$8064
?  ROWSTART=$805C   ?  RTSMOV  =$81F8      S2      =$801F   ?  SB1     =$8100
   SB2     =$8102      SCALE   =$8240   ?  SENDBYTES=$80FE      SETUP   =$8010
   SETUP1  =$801A      SHOWPAGE=$8271      SLENGTH =$8250   ?  SPARE1  =$8003
?  SPARE2  =$8004   ?  SPARE3  =$8005      STATUS  =$C0A9   ?  STOR80OFF=$C000
?  STOR80ON=$C001      STRING  =$8200      TEMP1   =$05     ?  TEMP2   =$06
?  TEXT    =$C050      TMP     =$8290      TMP1    =$800A      TRANSLATE=$8220
   TRANSMAT=$8200      YTABLH  =$83D1      YTABLL  =$8311

Symbol table - numerical order:

   TEMP1   =$05     ?  TEMP2   =$06        HBASL   =$26        HBASH   =$27
   A1L     =$3C        A1H     =$3D        A2L     =$3E        A2H     =$3F
   A4L     =$42        A4H     =$43        GETAUX  =$0100   ?  PRINT   =$8000
?  SPARE1  =$8003   ?  SPARE2  =$8004   ?  SPARE3  =$8005      BYTE    =$8006
   NUM     =$8007   ?  DBYTE   =$8008      LNNUM   =$8009      TMP1    =$800A
   LCTR    =$800B      BCTR    =$800C      SETUP   =$8010      SETUP1  =$801A
   S2      =$801F   ?  DINIT   =$802A   ?  ROWSTART=$805C   ?  ROWLOOP  =$8064
   RLO     =$806E      RL1     =$807D   ?  RL2     =$8090      DEND    =$80B0
   D1      =$80BF      ROTBITS =$80C5      CCB1    =$80C7   ?  RB1     =$80D2
   RB2     =$80D7      RB3     =$80D9   ?  SENDBYTES=$80FE   ?  SB1     =$8100
   SB2     =$8102      OUTSTR  =$8113      MO      =$8117      M1      =$8124
   OUTBYTE =$8128      OB1     =$8129      OB2     =$813A      CHECK   =$8143
   CH1     =$814A      CHRTN   =$8151      OUTHEX  =$8152      HEXTBL  =$8169
   BLANK1  =$8179   ?  2M2AUX  =$81E0   ?  RTSMOV  =$81F8      BLANK2  =$81F9
   STRING  =$8200      TRANSMAT=$8200      TRANSLATE=$8220     SCALE   =$8240
   SLENGTH =$8250      LINES   =$8258      BITSPER =$8260      ENDARRAY=$8268
   SHOWPAGE=$8271      COPYPAGE=$827C   ?  MISC    =$828F      TMP     =$8290
   BUFF    =$8291      YTABLL  =$8311      YTABLH  =$83D1   ?  STOR80OFF=$C000
?  STOR80ON=$C001      RAMRDOFF=$C002      RAMRDON =$C003   ?  RAMWRTOFF=$C004
?  RAMWRT  =$C005   ?  ALTZP   =$C008   ?  COL80   =$C00D   ?  TEXT    =$C050
?  MIXSET  =$C053   ?  PAGE2OFF=$C054   ?  PAGE2ON =$C055   ?  HIRESOFF=$C056
?  HGR     =$C057   ?  HIRES   =$C057   ?  AN3     =$C05E      DATA    =$C0A8
   STATUS  =$C0A9      AUXMOVE =$C311   ?  HPOSN   =$F411
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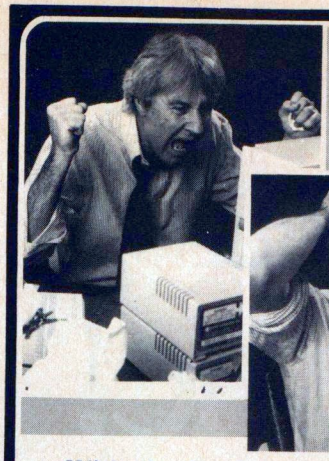

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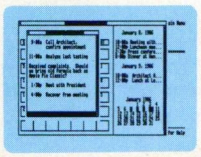

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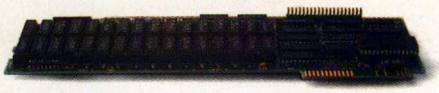

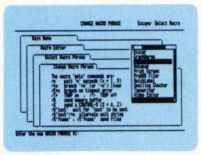

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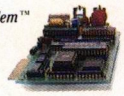

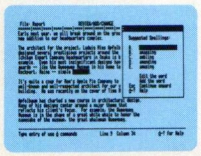

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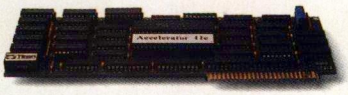

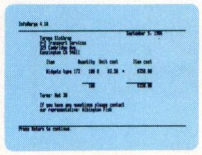

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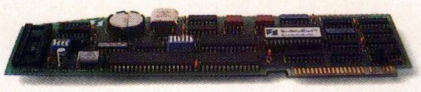

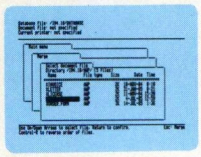

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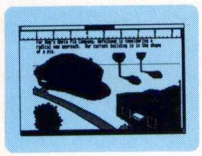

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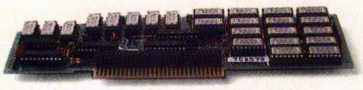

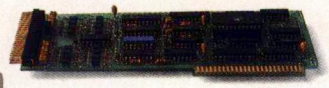

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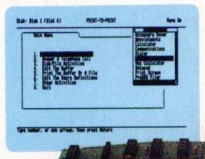

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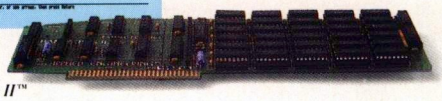

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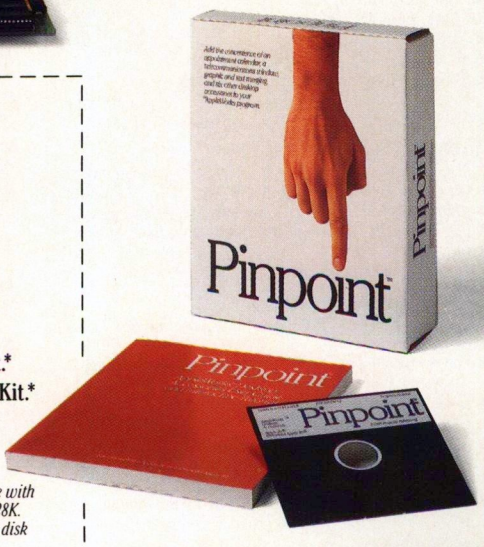
▶ Stop by a dealer near you for a test drive. Or call Toll Free and order direct from Pinpoint.

If, after 30 days, you're not completely satisfied, you can have your old mess back.

So you have nothing to lose. Except the mess on your desk.

Order by telephone direct using your credit card…Or get the name of your nearest dealer.



Yes, please rush my order direct for the products I've checked below. No hassles; 30-day money-back guarantee.

Name _____

Company _____

Address _____

City/State/Zip _____

Phone: Day _____ Evening _____

☐ VISA ☐ MasterCard ☐ Amex ☐ Check

Credit Card # _____

Expiration Date _____

Signature X _____

(Add $3.00 shipping and handling. CA residents add 6.5% sales tax.)

△ **$125 Pinpoint Desktop Accessories and the Spelling Checker.**
Be sure to include the $29 RAM Enhancement Kit, FREE.

☐ **$129 Point-to-Point.**
☐ **$79 InfoMerge.**
☐ **$69 Pinpoint Desktop Accessories.**
☐ **$69 Pinpoint Spelling Checker.***
☐ **$29 Pinpoint Apple IIe Upgrade Kit.**
☐ **$29 Pinpoint RAM Enhancement Kit.***
☐ **$29 Pinpoint Modem Enhancement Kit.***
☐ **$8 Pinpoint Graphic Printing Kit.***

Pinpoint's software requires an Apple IIc, Enhanced Apple IIe with 128K, or Apple IIe with Pinpoint Apple IIe Upgrade Kit and 128K. We recommend two floppy disk drives, a UniDisk 3.5,™ hard disk or RAM disk drive.

*Requires Pinpoint Desktop Software.

Pinpoint™

Pinpoint Publishing, Box 13323, Oakland, CA 94661
☎ (415) 654-3050

24 Hour Toll Free Order Phone
800-633-2252/Ext. 580

CIRCLE 32 READER SERVICE CARD

PINPOINT AppleWorks Desktop Accessories/Pinpoint Spelling Checker ◀

Computer Systems:
Apple IIc
Enhanced Apple IIe with 128K
Apple IIe with Pinpoint Apple IIe Upgrade Kit
Franklin 2000*
Video Technologies, Laser 128

PINPOINT IS FOR YOU

Whether you're one of over 800,000 satisfied AppleWorks users, own a RAM card, high-capacity disk drive, accelerator card or high-speed modem, or just need to get more work done every day, PINPOINT's Desktop Accessories are for you.

This product information report was prepared to help you confirm your decision to purchase Pinpoint's Desktop Accessory software programs for the Apple II computer.

AT YOUR FINGERTIPS

No other one piece of software does more to improve the performance and productivity of your Apple II than PINPOINT AppleWorks Desktop Accessories.

THE NEXT LEVEL FOR APPLE II

The next level in integrated software, Pinpoint offers unparalleled ability to realize the performance potential of your system. Pinpoint supports:

- ▲ 128K to 16MB RAM from Apple, AST, Applied Engineering and Checkmate
- ▲ High-capacity UniDisk 3.5 floppy disks
- ▲ ProFile, Sider and Corvus hard disks
- ▲ Titan Accelerator IIe, Applied Engineering Transwarp and MCT Speed Demon accelerator cards
- ▲ Apple, Hayes, Prometheus, and Zoom internal/external 300/1200 baud modems
- ▲ Graphics and text printing with Apple, Epson, Hewlett-Packard, Okidata and other printers
- ▲ Compatibility with dozens of interface cards

HERE'S WHAT PINPOINT DOES TODAY

The next level in convenience, no other software works from inside AppleWorks, Business Works, and other selected ProDOS software, to add the functionality of Pinpoint's Desktop Accessories. For starters, Pinpoint includes:

- ▲ Appointment Calendar
- ▲ Four-function Calculator
- ▲ Modem Communications Window
- ▲ Smart Telephone Dialer
- ▲ GraphMerge Graphics & Text Printing
- ▲ Notepad Baby Word Processor
- ▲ QuickLabel Envelope Addresser
- ▲ Memory-Writer Style Typewriter

HERE'S WHAT'S COMING FOR PINPOINT TOMORROW

The next level in open-architecture, Pinpoint can grow beyond the original set of eight Desktop Accessories to include up to 16 Accessories on the Pinpoint Desktop. For example, when they actually become available, you may want to add new programs like:

- ▲ Pop-up Spelling Checker
- ▲ Pop-up Thesaurus
- ▲ Pop-up Grammar Checker
- ▲ Instant Macro Keys
- ▲ Personal Check Writing
- ▲ Things to do Quick Lists
- ▲ Telephone Call Accounting
- ▲ Home Security and Appliance Control
- ▲ Travel Planner with Online Ticket Buying

In fact, some of these programs are just now becoming available from Pinpoint and other software developers.

VALUE THAT'S HARD TO BELIEVE

The next level in value, Pinpoint and optional Pinpoint Accessories are available nearly everywhere Apple Computers and Apple software is sold. Great software that becomes more valuable the more you use it, available today at very affordable prices.

With Pinpoint you get all this:

PINPOINT'S POP-UP FEATURES

- ▲ RAM resident with extended RAM support or disk-based Accessories.
- ▲ Pop-up from inside AppleWorks, Business Works, and other selected ProDOS software.
- ▲ Work with Catalyst, Mouse Desk and Prosel desktop managers.
- ▲ Always available. Closed-Apple-P pops-up PINPOINT's main menu can display up to 16 Accessory titles (8 supplied with the original Pinpoint program).
- ▲ AppleWorks' 55K desktop remains undisturbed with PINPOINT installed in RAM (basic 128K Apple II configuration).
- ▲ Open-Architecture. Uses ProDOS system files for Accessories—up to 16MB RAM each using segmented memory architecture.
- ▲ Write new Accessories all your own with the Pinpoint Toolkit.
- ▲ File and command compatible with AppleWorks.
- ▲ Open-Apple command support, with pull-down menus and dialog boxes.
- ▲ Context-sensitive, online help screens.
- ▲ Convenient 'Drag Mode' moves the pop-up menu anywhere on the screen.
- ▲ Customized Pinpoint disks can include one accessory, several, or all as desired to save floppy disk or available RAM disk space.
- ▲ Use with any ProDOS device.
- ▲ Not copy protected.

USE PINPOINT WITHOUT APPLEWORKS

Individual Pinpoint Desktop Accessories can be used as stand-alone applications without AppleWorks, Business Works or other primary application.

Select ProDOS BASIC from the Pinpoint menu to load BASIC. Pressing Open-Apple-P pops-up Pinpoint's main menu. Select the Accessory you wish to run and press RETURN.

Customized Pinpoint Disks

Pinpoint Desktop Accessories may be used individually, or in sets. All accessories are regular ProDOS system files, except the Dialer which is a RAM resident portion of the Pinpoint Dispatcher.

Accessories can be moved to and from any ProDOS 'working disk' to suit your individual requirements. This saves space on your 'working disks' and conserves valuable RAM disk space.

For example, you may wish to include only the Notepad, QuickLabel and Communications Accessories on your AppleWorks Database disks. Or just the Calendar, Notepad, Calculator, Typewriter and QuickLabel Accessories on your Word Processing and Spreadsheet disks. Or just use GraphMerge all by itself.

Copying Accessories

Use ProDOS Filer or Copy II Plus for copying Accessories on floppy disks; or you may use the Pinpoint RAM Enhancement Kit to automatically upload selected Accessories onto your partitioned RAM disk.

PINPOINT's POP-UP SPELLING CHECKER

One bungled word can spoil your entire document. But not with Pinpoint's pop-up Spelling Checker by your side.

The Spelling Checker is a new optional accessory that is added to the Pinpoint Desktop. Absolutely the most convenient way to produce letter-perfect AppleWorks documents.

The Spelling Checker requires PINPOINT or it will not run. Because the Spelling Checker actually uses AppleWorks' own editing power for automatic on-screen spelling corrections and page reformatting, the Spelling Checker works only with AppleWorks (word processing, spreadsheet and database modules).

Like other PINPOINT Accessories, the Spelling Checker pops-up from inside AppleWorks, ready anytime you want to check your work.

POP-UP SPELLING CHECKER FEATURES

- ▲ Checks documents of any size in memory.
- ▲ 60,000 word dictionary, refined from seven years of extensive use by over 250,000 people. Thorough testing has eliminated thousands of awkward, obscure, and antiquated words that might be incorrectly accepted as properly spelled words.
- ▲ Unlimited word capacity personal dictionary can be used for proper names, specialized terms, and frequently used abbreviations. This dictionary is limited only by ProDOS' 16MB maximum file size or the capacity of your disk.
- ▲ RAM resident Quick-Check list of frequently used words greatly speeds spell checking.
- ▲ Four spell checking codes: check individual words, paragraphs or documents; and optionally, elect not to display alternative spellings (i.e., for classroom use).
- ▲ Spell checking summaries: # words checked, # suspect words, # words corrected, and # added to personal dictionary. Summary display is optional.
- ▲ Configure default mode settings, including sound option, and paragraph/document spell checking summaries.
- ▲ One single-sided Apple 5.25" floppy disk can store the spell checking software, main dictionary and approximately a 3,000 word personal dictionary.
- ▲ One UniDisk 3.5™ can store AppleWorks, all eight original PINPOINT Desktop Accessories, the Spelling Checker plus both dictionaries at maximum capacity.
- ▲ For maximum performance, install the Spelling Checker on either a Hard Disk or partitioned RAM Disk using Pinpoint's RAM Enhancement Kit.

***Contact Pinpoint for more information.**

USING THE SPELLING CHECKER

- ▲ On command, check individual words, paragraphs or entire documents. Also checks words in spreadsheets and database entries.
- ▲ When an 'unknown' (misspelled) word is located a list of up to 10 suggested alternative words pops-up next to the unknown word.
- ▲ Highlight an alternative word, then press RETURN to automatically correct the word in place.
- ▲ 'Unknown' words may be added to your personal dictionary, edited in place, or left unchanged.
- ▲ Exit the Spelling Checker to PINPOINT or AppleWorks anytime.

NEW FOR SPRING 1986*

InfoMerge $79. On-screen, direct printing mailing program for AppleWorks. Automatically select names from AppleWorks, or manually scan data files forward/backward, add keyboard inputs, automatic reformatting, on-screen preview, then print. Again and again. Works with AppleWorks and with Pinpoint Installed!

Point-to-Point $129. Powerful telecomunications software with AppleWorks filecard interface, send/receive mail unattended (with clock), amazing conditional macros. XMODEM binary/text file transfers, 2400 Baud modem support and more.
Works with Pinpoint installed!

Pinpoint Toolkit $49. Ten handy new desktop accessories include programmer's calculator, pop-up Filer, accessory mover, video resource editor, resource converter, two screen print accessories, memory dump (window), the new RUN-RUN desktop environment, calendar printing accessories, plus a copy of "Inside Pinpoint", and complete reference manuals. For use with MICOL BASIC, KYAN PASCAL (available from Pinpoint) or ProDOS Assembler.

Pinpoint Apple IIe Upgrade Kit $29.00

- ▲ Permits Pinpoint and many 'new' Apple IIe software programs to run on plain Apple IIe's with 128K.
- ▲ Solves many of the compatibility problems older software programs have with the Enhanced Apple IIe.
- ▲ Includes Mouse Text Video ROM, exact copy of Apple's Character Generator ROM #342-0265 approved by Apple.
- ▲ Includes GTE or Rockwell 65C02 microprocessor.
- ▲ Handy chip puller included.
- ▲ Does NOT include Apple's proprietary 'CD' and 'EF' ROMs required for most mouse-based software. Apple Computer requires us to inform you that this Kit does not "Enhance" the Apple IIe, this Kit is only to be used on Apple IIe's, and this upgrade is performed at users' own risk.

Pinpoint RAM Enhancement Kit $29.00

- ▲ Configures partitioned RAM disks.
- ▲ Automatically uploads non-copy protected ProDOS applications and files to partitioned RAM disks.
- ▲ Includes a ProDOS RAM switcher for AppleWorks with Pinpoint and other ProDOS applications uploaded into RAM, such as *Business Works* accounting software, *Point-to-Point* communications software, or *InfoMerge* mail merge and print formatting program.
- ▲ Requires Pinpoint.

Pinpoint Modem Enhancement Kit $29.00

- ▲ Advanced modem software enhancement for Pinpoint's Communications Window.
- ▲ Logon macros with default communications setups.
- ▲ Keyboard and video character remapping (for encryption or terminal emulations).
- ▲ Selective character filtering.
- ▲ Required for Novation, Microcom and other non-standard external/internal modems or interface cards. Contact Pinpoint for details.
- ▲ Requires Pinpoint.

Pinpoint Printer Enhancement Kit $8.00

- ▲ Advanced installation utilities for non-Apple standard printers and interface cards.
- ▲ Simultaneous text and graphics printing.
- ▲ Epson FX, RX, LX, and MX-80 with GraphTrax+; Okidata 84, 92, 93, 192; H-P Thinkjet; Panasonic KX P1091, Smith-Corono D-200, Star Micronics SD-10 and SG-10 printers with standard interface cards, require the Pinpoint Printer Enhancement Kit to print graphics and text.
- ▲ Printer interfaces supported include: Generic BASIC Standard, Generic Pascal 1.1 Standard, Orange Micro Grappler Serial and Grappler+ Parallel Cards, Star Micronics Grafstar and Grafstar II, Microtek Dumpling 64, Dumpling-GX, and RV-611C, Interactive Structures PKASO/U, and RC Systems Slot Buster.
- ▲ Contact Pinpoint for details.
- ▲ Requires Pinpoint.

24 Hour Toll Free Order Phone
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Pinpoint

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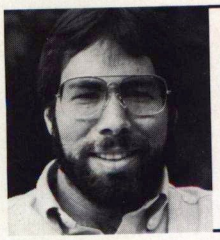
To boldly go at speeds no Apple has gone before.

Get TransWarp™. The fastest accelerator you can buy for your Apple™ IIe, II, or II+.

Computing at warp speed!

It's an experience you shouldn't miss. And with TransWarp, you won't have to. Because TransWarp will run your software up to *3.6 times faster* — leaving other accelerators in the stardust!

No more yawning while your Apple™ slowly rearranges text or calculates spreadsheets. With 256K of ultra-fast RAM, TransWarp speeds up *all* Apple software — including AppleWorks, Supercalc 3a, Visicalc, and all educational software, graphics and games. And it's compatible with all standard peripheral cards (such as RamWorks II and Apple memory cards), Profile and Sider hard disks, 3½" UniDisks, 80-column cards, modems, clock cards, mouses and more! You name it, TransWarp accelerates it. There's even a 16 bit upgrade chip available should 16 bit software become available for the Apple.



"I recommend Applied Engineering products wholeheartedly."

Steve Wozniak, the creator of Apple Computer

An important difference.

TransWarp's not the only speedup card on the market. But it's the only one that accelerates your Apple's main memory, ROM *and auxiliary memory.* And with more and more programs residing in auxiliary memory, buying anyone else's accelerator makes less and less sense. TransWarp even works with most D.M.A. devices including the Swyft™ card.

There's one more difference. Since TransWarp doesn't use memory caching, it accelerates *all* software — and not just most of it.

A cinch to use.

Simply plug TransWarp into any slot in your Apple II, II+ or IIe — including slot 3 in the IIe. Instantly you'll be computing at speeds you only dreamed about before. And should you ever wish to run at normal speed, simply press the ESC key while turning your Apple on.

Since TransWarp is completely transparent, you won't need preboot disks or special software. It's ready to go right out of the package!

Speed = Productivity

Imagine the productivity gains you'll achieve when your programs are running over three times faster. TransWarp is so powerful, your Apple will make IBM PCs™ and even ATs™ look like slowpokes — whether you're planning taxes, plotting charts or playing games! Take a look at a few of the features that set TransWarp apart:

- 3.6 MHZ 65C02
- 256K of ultra-fast on-board RAM
- Accelerates main *and* auxiliary memory
- Low power consumption for cool operation
- Totally transparent operation with all software
- Plugs into any slot, including slot 3 on the Apple IIe
- Accelerated 16 bit option available

Satisfaction guaranteed!

Give *your* Apple the TransWarp advantage. With our risk-free 15-day money back guarantee, you have nothing to lose but wasted time. Call today!

TransWarp Accelerator $279
16 bit upgrade (may add later) $89

For fast response:

Call Applied Engineering, 9 a.m. to 11 p.m., 7 days at (214) 241-6060. MasterCard, VISA and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 if outside U.S.A.

Or mail check or money order to Applied Engineering, P. O. Box 798, Carrollton, TX 75006.

Applied Engineering

The Apple enhancement experts.

P. O. Box 798, Carrollton, TX 75006 (214) 241-6060

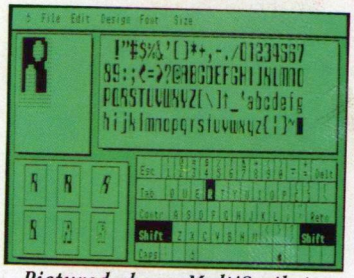
CIRCLE 9 READER SERVICE CARD

MultiScribe™
Creative Writing for Your Apple® IIc™/IIe™

Now your Apple IIc or IIe can offer you the type of creativity that you might have thought was available only with a Macintosh.™ MultiScribe is a full feature word processor that uses double hi-res and proportional spacing to give your Apple all the character of a Mac.

You supply the imagination, MultiScribe does the rest.

There are no complicated commands to learn. Easy to use pull-down menus provide you with a wide range of type styles, character sizes, and text formatting options. You can choose the typeface that's right for your text – or create your own custom fonts with MultiScribe's font editor. And MultiScribe gives your writing style – any style, from bold and underline to italic, outline and shadow – just like MacWrite.™



Pictured above: MultiScribe's font editor.

If you're afraid of mice, don't worry.

With MultiScribe, you have the option of using a standard keyboard or a mouse. Use your mouse to pick and click commands from the pull-down menus . . . or use the arrow keys for "keyboard mouse" action. Each MultiScribe option has a keyboard equivalent displayed right on the menu, giving you the best of both worlds.

Don't upgrade your old computer, just your old files.

MultiScribe works with any IIc or IIe equipped with extended 80 column card and most dot-matrix printers, including Imagewriter,™ Epson,® and Okidata.® You can even use MultiScribe to customize files created by other word processing programs.

And best of all – the price.

MultiScribe is available for only $59.95. Just complete and mail the coupon below or call our toll-free number, **1-800-233-4088** (in Texas call **1-713-771-4627**).

$59.95

+ $3.00 shipping & handling
Texas residents add 5⅛% sales tax.
Outside U.S. add $10.00.
Make check or bank order payable to:
StyleWare, Inc.

Name

Street

City State Zip

☐ MasterCard® ☐ Visa ☐ Check/Money Order

Card# Exp. Date

☐ 5¼″ Diskette ☐ 3½″ Diskette

MultiScribe™

Creativity at your fingertips.

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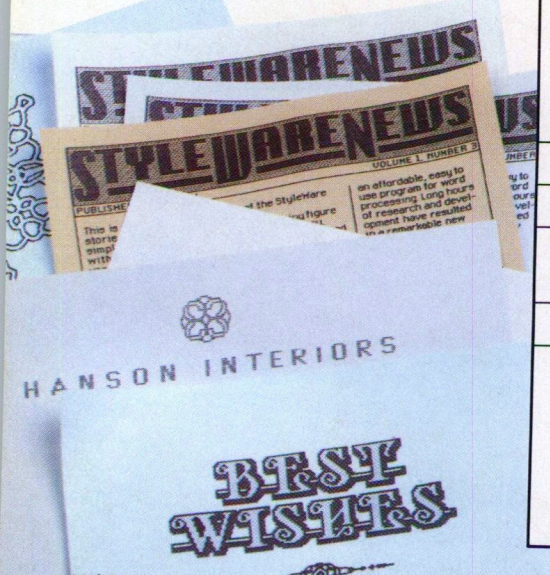
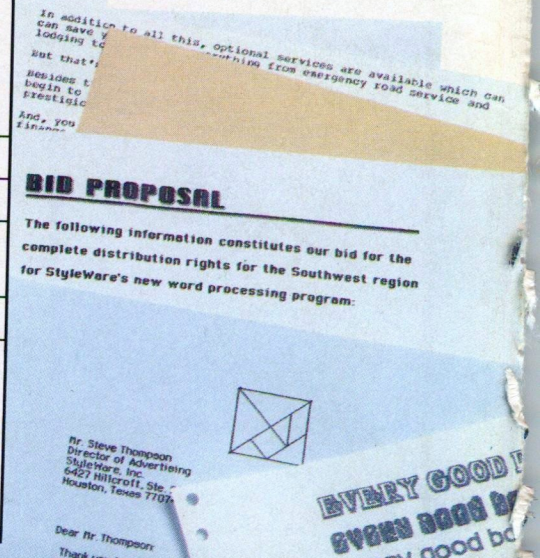
6405 Hillcroft, Suite 201, Houston, Texas 77081




BID PROPOSAL
The following information constitutes our bid for the complete distribution rights for the Southwest region for StyleWare's new word processing program:
Dear Mr. Thompson:

MultiScribe is a trademark of StyleWare, Inc. Apple is a registered trademark of Apple Computer, Inc. Apple IIe, Apple IIc, Imagewriter and MacWrite are trademarks of Apple Computer, Inc. Macintosh is a trademark licensed to Apple Computer, Inc. Epson is a registered trademark of Epson America, Inc. Okidata is a registered trademark of Okidata, and OKI AMERICA company.